

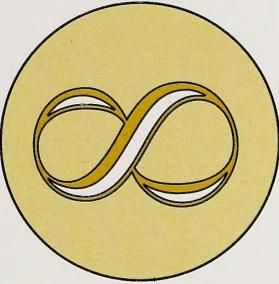
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# MATHEMATICS



## MODULE 4 ALGEBRA



LEARNING FACILITATOR'S MANUAL





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# **Mathematics 8**

## **Module 4: Algebra**

### **LEARNING FACILITATOR'S MANUAL**

## Note

This Mathematics Learning Facilitator's Manual contains answers to teacher-assessed assignments and the final test; therefore, it should be kept secure by the teacher. Student's should not have access to these assignments or the final test until they are assigned in a supervised situation. The answers should be stored securely by the teacher at all times.

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Project Manager: Linda Cox, Alberta Distance Learning Centre  
Site Coordinator: Marie Hauk, University of Alberta  
Curriculum Validator: Merv Lastiwka, Edmonton Public Schools  
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Copyright Officer: Gail Hove, Barrhead Employment Agency  
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Writers: Lynda Antoniuk, Edmonton Public Schools  
Rod Buga, Edmonton Roman Catholic Separate Schools  
Sharon Kratty, Edmonton Public Schools  
Ralph Lee, Edmonton Public Schools  
Susan Ludwig, Edmonton Roman Catholic Separate Schools  
Wendy Lukawesky, Edmonton Public Schools  
Carolyn Martin, Edmonton Roman Catholic Separate Schools  
Dennis McCarthy, Alberta Distance Learning Centre  
Bill Peterson, Alberta Distance Learning Centre  
Lucy Plaist, Alberta Distance Learning Centre  
Richard Robinson, Alberta Distance Learning Centre  
Bryan Sosnowski, Edmonton Public Schools  
Joe Symak, Alberta Distance Learning Centre  
Peter Tymkow, Alberta Distance Learning Centre  
Jim Williams, Edmonton Public Schools

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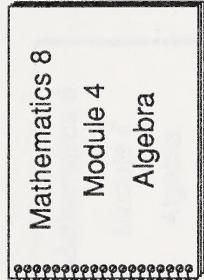
## MODULE INTRODUCTION

### What Lies Ahead

In the Module Introduction you will preview the module and learn how the module will be evaluated.

### Gathering Materials

For this section the student will need these items.



- Emphasize to the students that the goal is to preview the module.
- Discuss the learning process, time management, and evaluation with the students. See the following suggestions.

### Guiding the Student

## The Learning Process

Each section of Module 4 deals with a different skill involving algebra.

Sections have several activities.

- Introductory Activities
- Practice Activities
- Extra Practice
- Concluding Activities

Remind the students that they will not be expected to do all the activities. You will help them decide what to do.

## Time Management

Decide how long the student will need to complete the module. (The average student should spend about 7 weeks in a 40-week year to complete the module. It is recommended that students spend no more than 1 hour at a time doing mathematics.)

### Evaluation

Explain to the students how the module will be evaluated.



## GETTING SET

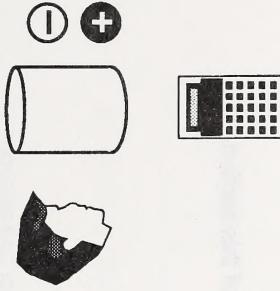
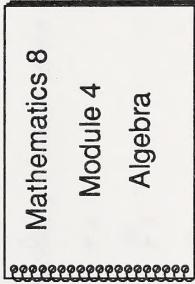
### What Lies Ahead

This section will pretest the following skills.

- using variables in an algebraic expression
- evaluating expressions for a given value of the variable
- simplifying algebraic expressions by combining like terms
- using variables to write mathematical expressions and sentences
- solving equations using additive inverses
- solving equations using multiplicative inverses
- solving equations using additive and multiplicative inverses
- generating a set of ordered pairs
- plotting ordered pairs
- producing a graph
- describing relations

### Gathering Materials

For this section the student will need these items.



### Guiding the Student

- Emphasize to the students that the goal of this section is to discover their strengths and weaknesses.

- Help the students check their answers to the pretest. It is not necessary to correct any errors at this time. See the last page of this section for further directions.

**Pretest****Suggested Answers**

1. Translate each English phrase into a mathematical expression.
  - a. five times Sam's age
  - b. Helen's mass decreased by two kilograms
  - c. the distance from John's house to work divided by two
  - d. ten dollars more than Ruth's wage
  - e. the sum of the length and width of the house
2. Use learning aids (cylinders and counters) to do the following.
  - a. Model  $x$  and evaluate if  $x = -1$ .
  - b. Model  $-x$  and evaluate if  $x = -1$ .
  - c. Model  $x + 2$  and evaluate if  $x = -1$ .
  - d. Model  $x + y$  and evaluate if  $x = -1$  and  $y = +1$ .
  - e. Model  $x + xy$  and evaluate if  $x = -1$  and  $y = +1$ .

1. a.  $5 \times a$  or  $5a$
- b.  $m - 2$
- c.  $d + 2$  or  $\frac{d}{2}$
- d.  $w + 10$
- e.  $\ell + w$

2. Modelling is shown at the end of this section.

- a.  $-1$
- b.  $+1$
- c.  $+1$
- d.  $0$
- e.  $-2$

3. Use paper and pencil methods to evaluate the following expressions.

- a.  $2a + 7$  if  $a = 3$
- b.  $n^2 - 2$  if  $n = -5$
- c.  $e - 3d$  if  $d = 2$  and  $e = -2$
- d.  $3y + z$  if  $y = \frac{1}{3}$  and  $z = \frac{1}{2}$

4. Use learning aids (cylinders and counters) to model and simplify the following expressions.

- a.  $t + t + t + t$
- b.  $s + 2 - 3 + 1$
- c.  $a + 2 + a - 5$
- d.  $a + b - 3 + a$
- e.  $b + c - 1 - b$

5. Use paper and pencil methods to simplify the following expressions.

- a.  $3f - 1 + 2 - f$
- b.  $2a + 3ab + a - b$
- c.  $-cd + 3c^2 + cd - d$
- d.  $2a - 2 + 5a$

5. a.  $2f + 1$

b.  $3a + 3ab - b$

c.  $3c^2 - d$

d.  $7a - 2$

4. Modelling is shown at the end of this section.

- a.  $4t$
- b.  $s$
- c.  $2a - 3$
- d.  $2 + b - 3$
- e.  $c - 1$

6. Translate the following sentences into equations.

- Two times a number plus three results in thirteen.
- Linton's age is six less than Evon's.
- Katsuta's mass increased by 10 kg is the same as Hayanu's.
- The length of the building squared is five less than the width of the building.

7. Model the following equations. Then solve the equations using inspection or guess-check-revise methods. Verify the solutions.

- $x + 2 = 8$
- $3d = 12$
- $2m - 1 = 7$
- $5n = 2n - 9$
- $2y + 3 = y - 1$

6. a.  $2n + 3 = 13$

- $e - 6 = \ell$
- $k + 10 = h$
- $\ell^2 = w - 5$

7. Modelling is shown at the end of this section.

8. Solve the following equations using inspection or guess-check-revise methods. Verify using paper and pencil methods.

- a.  $3w + 2 = 11$
- b.  $5x + 1 = 3x - 9$

9. Solve  $x + 3 = 8$  using additive inverses. Verify the solution.

- a. Use models.
- b. Use paper and pencil methods.

10. Solve  $3y = -12$  using multiplicative inverses. Verify the solution.

- a. Use models.
- b. Use paper and pencil methods.

11. Solve the following using paper and pencil methods. Verify the solutions.

- a.  $\frac{r}{3} = 5$
- b.  $\frac{n}{2} = \frac{7}{8}$

12. Solve  $3d + 5 = 11$  using inverses. Verify the solution.

- a. Use models.
- b. Use paper and pencil methods.

8. a.  $w = 3$

9. a. Modelling is shown at the end of this section.

b. 
$$\begin{array}{r} x + 3 = 8 \\ - 3 = -3 \\ \hline x = 5 \end{array}$$

10. a. Modelling is shown at the end of this section.

b. 
$$\begin{array}{r} 3y = -12 \\ \frac{1}{3} \times 3y = \frac{1}{3} \times (-12) \\ y = -4 \end{array}$$

11. a.  $r = 15$

b.  $n = 1\frac{3}{4}$

12. a. Modelling is shown at the end of this section.

b. 
$$\begin{array}{r} 3d + 5 = 11 \\ - 5 = -5 \\ \hline 3d = 6 \\ \frac{1}{3} \times 3d = \frac{1}{3} \times 6 \\ d = 2 \end{array}$$

13. Complete the following table of values.

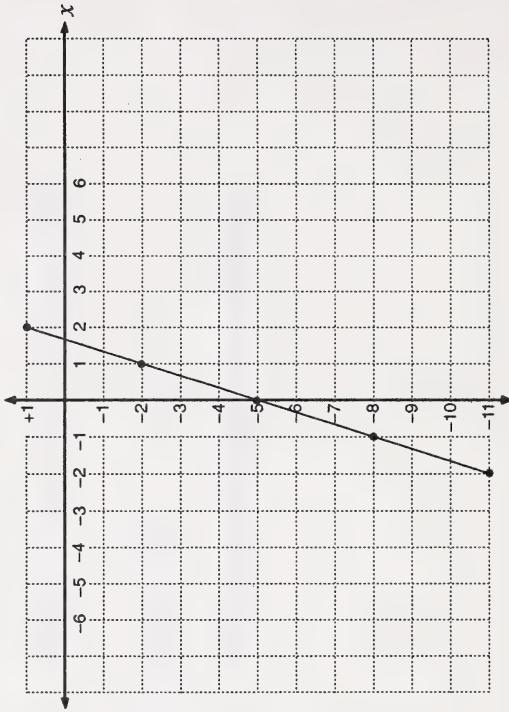
$y = 3x - 5$	
$x$	$y$
-2	
-1	
0	
1	
2	

13.

$y = 3x - 5$	
$x$	$y$
-2	-11
-1	-8
0	-5
1	-2
2	1

14. Graph  $y = 3x - 5$ .

14.



15. Jerit unpacks cans from boxes at a grocery store.

Number of Boxes ( $b$ )	Relation	Number of Cans ( $c$ )
1	$12 \times 1$	12
2	$12 \times 2$	24
3	$12 \times 3$	36
4	$12 \times 4$	48
5	$12 \times 5$	60

15. a. The number of cans is twelve times the number of boxes.

b.  $c = 12b$

c.  $(1, 12), (2, 24), (3, 36), (4, 48), (5, 60), \dots$

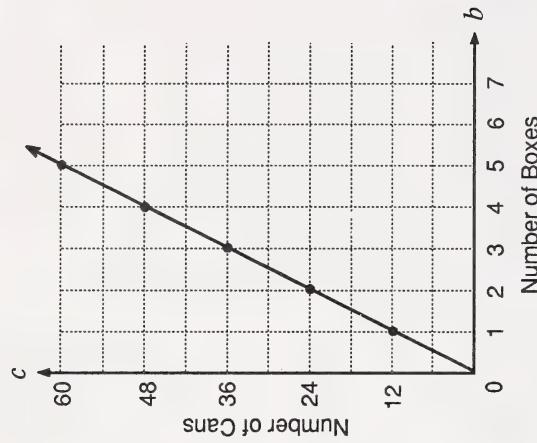
a. Use words to describe the relationship.

b. Write an equation to describe the relationship.

c. Use ordered pairs to describe the relationship.

d. Use a graph to describe the relationship.

d.



**Modelling**2. a. Model  $x$ .Evaluate if  $x = -1$ .

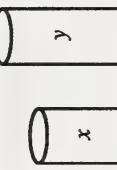
The value of the expression is  $-1$ .

b. Model  $-x$ .Evaluate if  $x = -1$ .

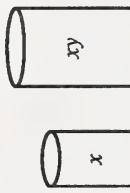
$-x$  is opposite of  $x$ .  
The value of the expression is  $+1$ .

c. Model  $x + 2$ .Evaluate if  $x = -1$ .

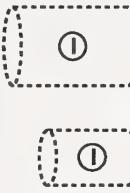
The value of the expression is  $+1$ .

d. Model  $x + y$ .Evaluate if  $x = -1$  and  $y = +1$ .

The value of the expression is  $0$ .

e. Model  $xy$ .Evaluate if  $x = -1$  and  $y = +1$ .

If  $x = -1$  and  $y = +1$ ,  $xy = (-1) \times (+1)$  or  $-1$ .



The value of the expression is  $-2$ .

4. a. Model  $t + t + t + t$ .

This expression can be called  $4t$ .

Remove the zero pairs.



This expression is  $2a - 3$ .

b. Model  $s + 2 - 3 + 1$

Remove the zero pairs.

This expression is  $s$ .

c. Model  $a + 2 + a - 5$ .

Group the cylinders labelled  $a$ .

This expression is  $a$ .

d. Model  $a + b - 3 + a$ .

Group the cylinders labelled  $a$ .

This expression is  $2a + b - 3$ .

e. Model  $b + c - 1 - b$ .

Remove the zero pairs.

The expression is  $c - 1$ .

7. a. Model  $x + 2 = 8$ .

$x + 2 = 8$

LS = RS

Verify  $x = +6$ .

$x + 2 = 8$

LS = RS

b. Model  $3d = 12$ .

$3d = 12$

LS = RS

Verify  $d = +4$ .

$3d = 12$

LS = RS

c. Model  $2m - 1 = 7$ .

$2m - 1 = 7$

LS = RS

Verify  $m = +4$ .

$m + 4 = 7$

LS = RS

d. Model  $5n = 2n - 9$ .

$5n = 2n - 9$

LS = RS

Verify  $n = -3$ .

$5n = 2n - 9$

LS = RS

e. Model  $2y + 3 = y - 1$ .

$2y + 3 = y - 1$

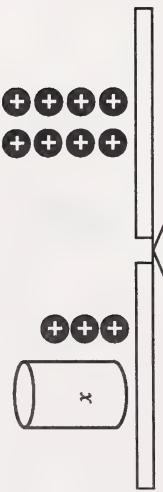
LS = RS

Verify  $y = -4$ .

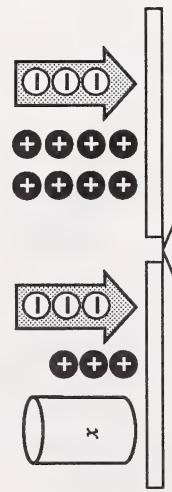
$2y + 3 = y - 1$

LS = RS

9. a. Model  $x + 3 = 8$ .



Add  $-3$  to both sides.



Remove the zero pairs.

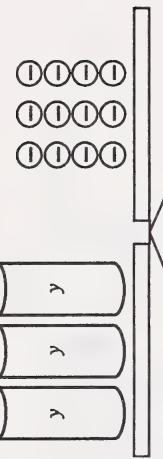


Verify  $x = +5$ .

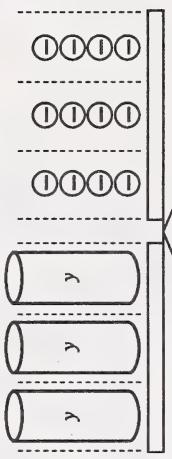


$$\text{LS} = \text{RS}$$

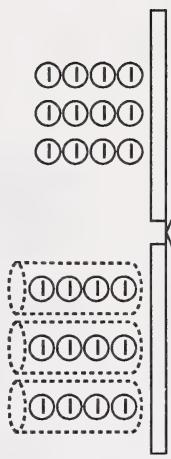
10. a. Model  $3y = -12$ .



Divide each side into 3 groups.



Verify  $y = -4$ .

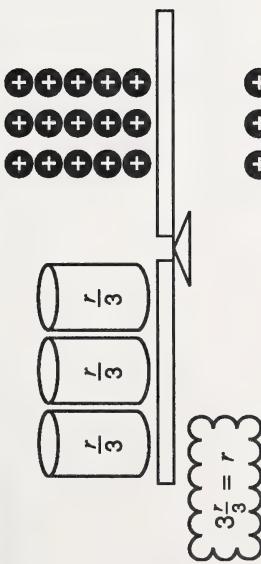


$$\text{LS} = \text{RS}$$

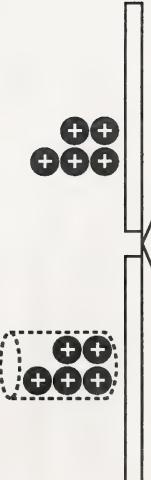
11. a. Model  $\frac{r}{3} = 5$ .



Multiply each side by 3.



Verify  $r = 15$  and  $\frac{r}{3} = 5$ .

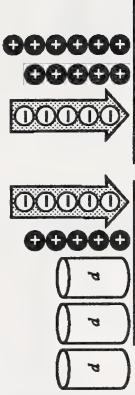


$LS = RS$

12. a. Model  $3d + 5 = 11$ .



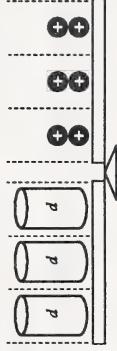
Add -5 to each side.



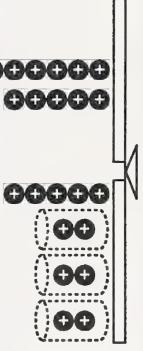
Remove the zero pairs.



Divide each side by 3.



Verify  $d = +2$ .



$LS = RS$



## TRANSLATING WORDS AND PHRASES

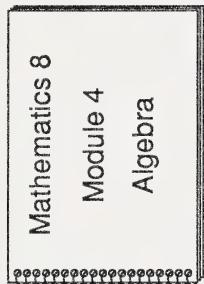
### What Lies Ahead

In this section the student will learn these skills.

- translating English phrases into mathematical expressions
- interpreting the meaning of variables and algebraic expressions

### Gathering Materials

For this section the student will need these items.



### Guiding the Student

- Emphasize to the students the goal of this section.
- Help the students decide what to do in this section.
- Help the students check their answers to the activities in this section and correct any errors.

**Introductory Activities**

Translate each English phrase into a mathematical expression

1. seven baseballs increased by nine baseballs      1.  $7 + 9$
2. the difference between nine poodles and six poodles      2.  $9 - 6$
3. five groups of fifteen children      3.  $5 \times 15$
4. forty-eight pizzas divided by sixteen people      4.  $48 \div 16$
5. three more than the difference of five years and two years      5.  $3 + 5 - 2$
6. thirty-two tapes decreased by eight groups of three tapes      6.  $32 - 8 \times 3$

**Suggested Answers**

**Practice Activities****Suggested Answers**

1. Translate the following English expressions into mathematical expressions containing variables.

a. the sum of a number and three

b. three subtracted from a number

c. two thirds of a number

d. a number squared

e. five more than a number

f. twice a number increased by six

g. one less than two thirds of a number

h. four more than one half of a number

i. the difference between eight and a number cubed

1. a.  $n + 3$

b.  $n - 3$

c.  $\frac{2}{3}n$

d.  $n^2$

e.  $n + 5$

f.  $2n + 6$

g.  $\frac{2}{3}n - 1$

h.  $\frac{1}{2}n + 4$

i.  $8 - n^3$

**Print Alternative**

2. Translate the following situations into mathematical phrases.

a. Marco's age increased by two years      2. a.  $a + 2$

b. twice the distance from Muriel's house to school      b.  $2d$

c. a number squared      c.  $n^2$

d. five times the price of a car      d.  $5p$

e. twice Amar's salary plus three dollars      e.  $2s + 3$

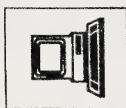
f. one half of the price      f.  $\frac{1}{2}p$

g. a boy's age twelve years from now      g.  $a + 12$

h. the sum of Ardiith's mass and twenty-five kilograms      h.  $m + 25$

**Computer Alternative**

3. Do Introductory Lesson 1 of *BRITANNICA:*  
    *Problem Solving in Algebra.*



## Concluding Activities

1. Read the following phrases aloud.
  - a. three times four, less two
  - b. three times, four less two
  - c. the sum of two, and five times three
  - d. the sum of two and five, times three

## Suggested Answers

1. Read the following phrases aloud.
  - a.  $(3 \times 4) - 2$
  - b.  $3 \times (4 - 2)$
  - c.  $2 + (5 \times 3)$
  - d.  $3 \times (2 + 5)$
2. How did you translate the commas when you read the phrases in Question 1?
3. Mathematicians sometimes use brackets to show order of operations. Translate the expressions in Question 1 into mathematical expressions containing brackets.

4. Translate the following English expressions into algebraic expressions.

- a. sixteen times, two more than a number
- b. sixteen times two, more than a number
- c. four times the length, plus eight centimetres
- d. four times, the length plus eight centimetres

- 4. a.  $16(2 + n)$
- b.  $(16 \times 2) + n$
- c.  $4\ell + 8$
- d.  $4(\ell + 8)$  or  $4 \times (\ell + 8)$

5. Remember that subtraction is sometimes translated in a different order. Translate the following English expressions into mathematical expressions.

- a. the difference of three, and two times a number
- b. the difference of three and two, times a number
- c. four less than three, times a number
- d. four less than, three times a number



## EVALUATING ALGEBRAIC EXPRESSIONS

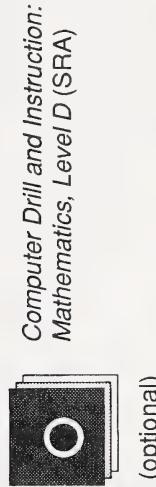
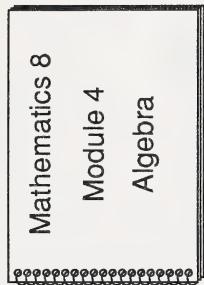
### What Lies Ahead

In this section the student will learn these skills.

- modelling algebraic expressions
- evaluating algebraic expressions using models
- evaluating algebraic expressions using paper and pencil methods

### Gathering Materials

For this section the student will need these items.



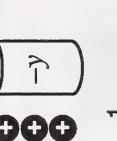
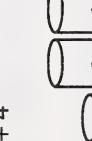
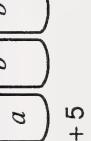
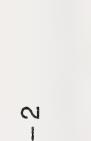
### Guiding the Student

- Emphasize to the students the goal of this section.
- Help the students decide what to do in this section.
- Help the students check their answers to the activities in this section and correct any errors.

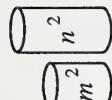
**Introductory Activities**

1. a. Model  $x + 5$ .
- b. Evaluate  $x + 5$  if  $x = +3$ .
- c. Evaluate  $x + 5$  if  $x = -2$ .

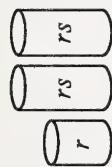
**Suggested Answers**

1. a. 
- b. 
- c. 
2. a. 
- b. 
- c. 
3. a. 
- b. 
- c. 
4. a. 
- b. 
- c. 

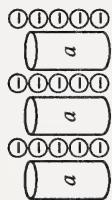
5. a. Model  $m^2 + n^2$ .  
b. Evaluate  $m^2 + n^2$  if  $m = +2$  and  $n = +3$ .  
c. Evaluate  $m^2 + n^2$  if  $m = -1$  and  $n = 0$ .



6. a. Model  $r + 2rs$ .  
b. Evaluate  $r + 2rs$  if  $r = -1$  and  $s = +2$ .  
c. Evaluate  $r + 2rs$  if  $r = +3$  and  $s = -1$ .



7. a. Model  $3(a - 5)$ .  
b. Evaluate  $3(a - 5)$  if  $a = +1$ .  
c. Evaluate  $3(a - 5)$  if  $a = -1$ .



5. a.  $m^2 + n^2$ .  
b.  $+13$ .  
c.  $+1$ .

6. a.  $r + 2rs$ .  
b.  $-5$ .  
c.  $-3$ .

7. a.  $3(a - 5)$ .  
b.  $+12$ .  
c.  $-18$ .

**Practice Activities****Computer Alternative**

1. Do Lesson 5 of the *Pre-Algebra* disk from the package *Computer Drill and Instruction: Mathematics, Level D* (SRA).

Remember, if you need help, press the SHIFT key and the **[?]** key.

**Print Alternative**

2. a. Evaluate  $n + 10$  if  $n = 8$ .  
  
b. Evaluate  $2p$  if  $p = 0.6$ .
2. a. 18  
b. 1.2  
c. 1
- c. Evaluate  $5r - 2$  if  $r = \frac{3}{5}$

**Suggested Answers**

1. Computer corrected

d. Evaluate  $3 + 4s$  if  $s = 0.5$ .

d. 5

e. Evaluate  $2n^2 + 1$  if  $n = 4$ .

e. 33

f. Evaluate  $0.5n - 0.1$  if  $n = 2$ .

f. 0.9

## Concluding Activities

1. Complete the following tables. Evaluate the first three values and then use a pattern to help you find the last three values.

a.	$a$	$a + 2$
	1	
	2	
	3	
	4	
	5	
	6	

a.	$a$	$a + 2$	Pattern
	1	3	$\{ \} + 1$
	2	4	$\{ \} + 1$
	3	5	$\{ \} + 1$
	4	6	$\{ \} + 1$
	5	7	$\{ \} + 1$
	6	8	

b.	$b$	$4b - 1$
	1	
	2	
	3	
	4	
	5	
	6	

b.	$b$	$4b - 1$	Pattern
	1	3	$\{ \} + 4$
	2	7	$\{ \} + 4$
	3	11	$\{ \} + 4$
	4	15	$\{ \} + 4$
	5	19	$\{ \} + 4$
	6	23	

c.

$c$	$2c$
1	
2	
3	
4	
5	
6	

c.

	$c$	$2c$	Pattern
	1	2	$\{ +2 \}$
	2	4	$\{ +2 \}$
	3	6	$\{ +2 \}$
	4	8	$\{ +2 \}$
	5	10	$\{ +2 \}$
	6	12	$\{ +2 \}$

d.

$d$	$3d + 2$
1	
2	
3	
4	
5	
6	

d.

	$d$	$3d + 2$	Pattern
	1	5	$\{ +3 \}$
	2	8	$\{ +3 \}$
	3	11	$\{ +3 \}$
	4	14	$\{ +3 \}$
	5	17	$\{ +3 \}$
	6	20	$\{ +3 \}$

e.	$f$	$5f - 1$
1	1	4
2	2	9
3	3	14
4	4	19
5	5	24
6	6	29

e.	$f$	$5f - 1$	Pattern
1	1	4	{ } + 5
2	2	9	{ } + 5
3	3	14	{ } + 5
4	4	19	{ } + 5
5	5	24	{ } + 5
6	6	29	{ } + 5

2. How are the patterns in Question 1 similar to the algebraic expressions?  
Hint:  $a + 2 = 1a + 2$ .

3. Each of the following algebraic expressions has a missing number shown by  $\blacksquare$ . Use the table of values to find each value of  $\blacksquare$ .

a.	$k$	$\blacksquare k - 3$
1	1	1
2	5	5
3	9	9
4	13	13

3.	$k$	$\blacksquare k - 3$	Pattern
	1	1	{ } + 4
	2	5	{ } + 4
	3	9	{ } + 4
	4	13	{ } + 4

So, using the pattern,  
 $\blacksquare = 4$ .

b.

$y$	$\blacksquare y + 1$
1	7
2	13
3	19
4	25

b.

$y$	$\blacksquare y + 1$	Pattern
1	7	$\{ + 6$
2	13	$\{ + 6$
3	19	$\{ + 6$
4	25	$\{ + 6$

So, using the pattern,  
 $\blacksquare = 6$ .

c.

$d$	$\blacksquare d - 1$
1	1
2	3
3	5
4	7

c.

$d$	$\blacksquare d - 1$	Pattern
1	1	$\{ + 2$
2	3	$\{ + 2$
3	5	$\{ + 2$
4	7	$\{ + 2$

So, using the pattern,  
 $\blacksquare = 2$ .

d.

$x$	$\blacksquare x + 4$
1	7
2	10
3	13
4	16

d.

$x$	$\blacksquare x + 4$	Pattern
1	7	$\{ + 3$
2	10	$\{ + 3$
3	13	$\{ + 3$
4	16	$\{ + 3$

So, using the pattern,  
 $\blacksquare = 3$ .

4. Complete the following tables. Evaluate the first three variables and then use a pattern to help you find the last three values.

a.	$a$	$a^2$
1		
2		
3		
4		
5		
6		

4. a.	$a$	$a^2$	Pattern
	1	1	$\{ +3 \} + 2$
	2	4	$\{ +5 \} + 2$
	3	9	$\{ +7 \} + 2$
	4	16	$\{ +9 \} + 2$
	5	25	$\{ +11 \} + 2$
	6	36	

b.	$b$	$b^2 + 3$	Pattern
	1	4	$\{ +3 \} + 2$
	2	7	$\{ +5 \} + 2$
	3	12	$\{ +7 \} + 2$
	4	19	$\{ +9 \} + 2$
	5	28	$\{ +11 \} + 2$
	6	39	

c.	$c$	$\frac{2}{c} - 1$
1		
2		
3		
4		
5		
6		

c.  $c$        $c^2 - 1$

		Pattern
1	0	$\{ + 3 \}$
2	3	$\{ + 5 \}$
3	8	$\{ + 7 \}$
4	15	$\{ + 9 \}$
5	24	$\{ + 11 \}$
6	35	

c.  $c$        $c^2 - 1$

5. Complete the following statements.

- In Question 1 the exponent of each variable is \_\_\_\_\_, and you found the difference \_\_\_\_\_ to obtain the pattern. Hint:  $a + 2 = a^1 + 2$  and  $4b - 1 = 4b^1 - 1$ .
- In Question 4 the exponent of each variable is \_\_\_\_\_, and you found the difference \_\_\_\_\_ to obtain the pattern.

- In Question 1 the exponent of each variable is 1, and you found the difference once to obtain the pattern.
- In Question 4 the exponent of each variable is 2, and you found the difference twice to obtain the pattern.

6. Each of the following algebraic expressions has the exponent of the variable missing. Use the table of values to find the missing exponent.

$a$	$a \blacksquare + 1$
1	2
2	5
3	10
4	17

a.  $a$

$a$	$a \blacksquare + 1$
1	2
2	5
3	10
4	17

Pattern

$$\left. \begin{array}{l} \\ \\ \\ \end{array} \right\} + 3$$

$$\left. \begin{array}{l} \\ \\ \\ \end{array} \right\} + 5$$

$$\left. \begin{array}{l} \\ \\ \\ \end{array} \right\} + 7$$

$$\left. \begin{array}{l} \\ \\ \\ \end{array} \right\} + 2$$

The difference was found twice, so  $\blacksquare = 2$  and  
 $a^{\blacksquare} + 1 = a^2 + 1$ .

b.  $b$

$b$	$b \blacksquare - 1$
1	0
2	1
3	2
4	3

Pattern

$$\left. \begin{array}{l} \\ \\ \\ \end{array} \right\} + 1$$

$$\left. \begin{array}{l} \\ \\ \\ \end{array} \right\} + 1$$

$$\left. \begin{array}{l} \\ \\ \\ \end{array} \right\} + 1$$

The difference was found once, so  $\blacksquare = 1$  and  
 $b^{\blacksquare} - 1 = b^1 - 1$ , or  $b - 1$ .

## SIMPLIFYING ALGEBRAIC EXPRESSIONS

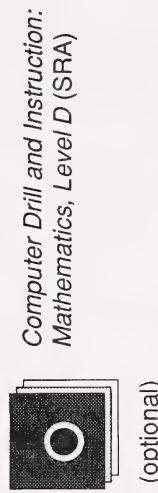
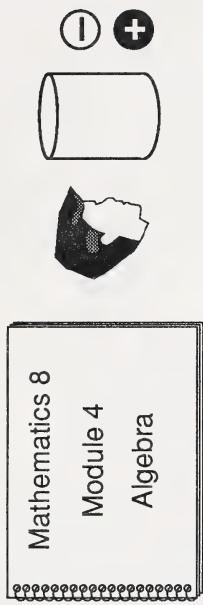
### What Lies Ahead

In this section the student will learn these skills.

- identifying like terms and unlike terms
- simplifying algebraic expressions using models
- simplifying algebraic expressions using paper and pencil methods

### Gathering Materials

For this section the student will need these items.



### Guiding the Student

- Emphasize to the students the goal of this section.
- Help the students decide what to do in this section.
- Help the students to check their answers to the activities in this section and correct any errors.

**Introductory Activities**

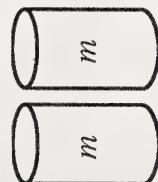
Use models to simplify the following expressions.

1.  $m + m$
2.  $d + 2 + d - 4$
3.  $y + y + 3 + x + 1 + x - 6 + x$
4.  $a + y + a - 3$
5.  $-4 + n + n + 7 - 6 + n$
6.  $j + 3 + j + 3 + j + 3$

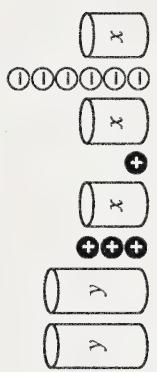
**Suggested Activities**

See the models on the following pages.

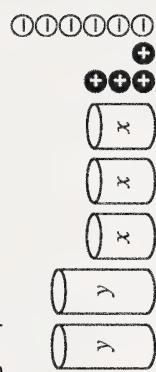
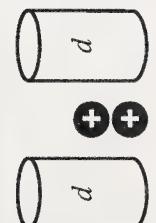
1.  $2m$
2.  $2d - 2$
3.  $2y + 3x - 2$
4.  $2a + y - 3$
5.  $3n - 3$
6.  $3j + 9$

**Modelling**1. Model  $m + m$ .

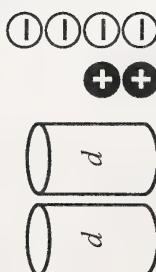
$$\text{So, } m + m = 2m.$$

3. Model  $y + y + 3 + x + 1 + x - 6 + x$ .

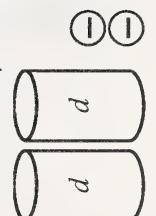
Regroup.

2. Model  $d + 2 + d - 4$ .

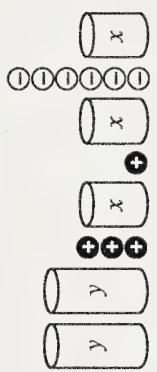
Regroup.



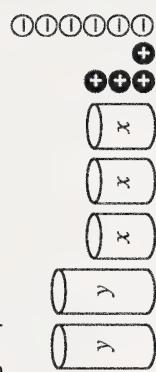
Remove the zero pairs.



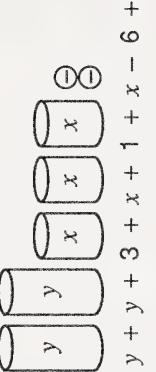
$$\text{So, } d + 2 + d - 4 = 2d - 2.$$

3. Model  $y + y + 3 + x + 1 + x - 6 + x$ .

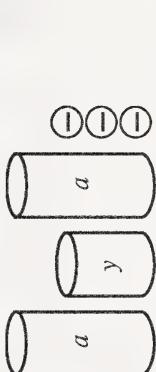
Regroup.



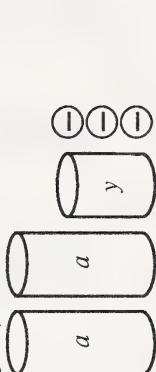
Remove the zero pairs.



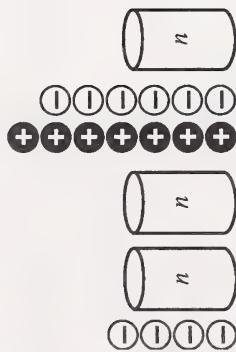
$$\text{So, } y + y + 3 + x + 1 + x - 6 + x = 2y + 3x - 2.$$

4. Model  $a + y + a - 3$ .

Regroup.



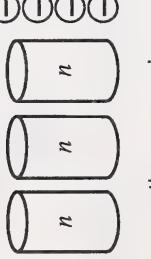
$$\text{So, } a + y + a - 3 = 2a + y - 3.$$

5. Model  $-4 + n + n + 7 - 6 + n$ .

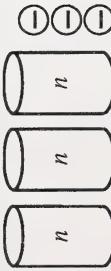
Regroup.



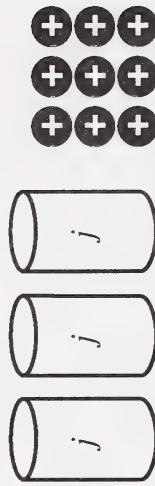
Regroup.



Remove the zero pairs.

 $\text{So, } -4 + n + n + 7 - 6 + n = 3n - 3.$ 6. Model  $j + 3 + j + 3 + j + 3$ .

Regroup.

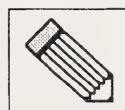
 $\text{So, } j + 3 + j + 3 + j + 3 = 3j + 9.$

**Practice Activities****Computer Alternative**

1. Do Lesson 9 of the *Pre-Algebra* disk from the package *Computer Drill and Instruction: Mathematics, Level D* (SRA).

**Print Alternative**

2. Simplify by collecting the like terms



a.  $2f + 5f$       2. a.  $7f$   
b.  $5x - 2x + 4z - 2z$       b.  $3x + 2z$   
c.  $3a - 2a^2 - 5a$       c.  $-2a^2 - 2a$   
d.  $3m - 2 + 4p + 7m + 7n - 13$       d.  $10m + 7n + 4p - 15$   
e.  $2a + 3b + 2ab + 5b - 8ab$       e.  $2a - 6ab + 8b$   
f.  $-6cd + 3c^2 + 2d^2 + cd + 4d^2$       f.  $3c^2 - 5cd + 6d^2$

**Suggested Answers**

1. Computer corrected

**Extra Practice****Suggested Answers**

1. Use the words **like** and **unlike** to describe each of the following pairs.

- a.  $3x$  and  $x$
- b.  $4y$  and  $4x$
- c.  $-2a^2$  and  $a$
- d. 8 and  $\frac{1}{5}$

2. Simplify the following expressions.

- a.  $6 + 4p - 3 - 6p$
- b.  $3a - a^2 + 5a - 4a^2$
- c.  $6a - 4ab + ab - 7a + 8a$
- d.  $-4p + 6n - 3n + 7p - 6p + 5n$
- e.  $4w - 7 + 3x + 5w + 13x - wx$

- 1. a. like
- b. unlike
- c. unlike
- d. like

- 2. a.  $-2p + 3$

- b.  $-5a^2 + 8a$
- c.  $7a - 3ab$
- d.  $8n - 3p$

- e.  $9w + 16x - wx - 7$

## Concluding Activities

1. Which of the following expressions are equivalent?

a.  $a^2 - b^2 + 2b^2 - a^2$

b.  $2a^2 + 3a - 2a^2$

c.  $3a - b + a + 2b$

d.  $-3b + 3a + 4b - 2a$

e.  $2a - b - a + 2b$

f.  $6a - 8 + 3a + 5$

g.  $3a + a + 4b - 3b$

h.  $2ab - b^2 - 2ab + 2b^2$

i.  $4a + 2b - a - 2b$

j.  $a^2 + a - a^2 + 2a$

## Suggested Answers

1. Expressions a. and h. are equivalent.

Expressions b., i., and j. are equivalent.

Expressions c. and g. are equivalent.

Expressions d. and e. are equivalent.

The expressions can each be simplified as shown:

a.  $1b^2$

b.  $3a$

c.  $4a + b$

d.  $a + b$

e.  $a + b$

f.  $9a - 3$

g.  $4a + b$

h.  $b^2$

i.  $3a$

j.  $3a$

2. Evaluate the following.

- a.  $2m + 6m$ , if  $m = 2$
- b.  $5q - 2q$ , if  $q = 2.7$
- c.  $5t - 3t + 2t$ , if  $t = \frac{1}{4}$
- d.  $3f - g - f + g$ , if  $f = 2$  and  $g = 5$

3. Collect the like terms in Question 2. Then evaluate the simplified expressions.

4. What do you notice about the answers in Questions 2 and 3?

- 2. a. 16
- b. 8.1
- c. 1
- d. 4

- 3. a.  $8m, 16$
- b.  $3q, 8.1$
- c.  $4t, 1$
- d.  $2f, 4$

4. The answers in Questions 2 and 3 are the same. In other words, you can evaluate before or after simplifying an expression.

## TRANSLATING SENTENCES

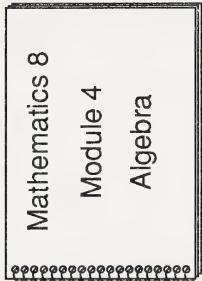
### What Lies Ahead

In this section the student will learn this skill.

- translating English sentences into equations

### Gathering Materials

For this section the student will need these items.



### Guiding the Student

- Emphasize to the students the goal of this section.
- Help the students decide what to do in this section.
- Help the students check their answers to the activities in this section and correct any errors.

## Introductory Activities

### Print Alternative



1. Write each of the following sentences as an equation.

a. Twelve decreased by a number is four.

b. The sum of the number and one half of the number is equal to forty-eight.

c. A number tripled decreased by 2 results in -7.

d. Three kilograms more than Bob's mass is fifty-two kilograms.

e. Five dollars more than double Marnie's money is \$79.

f. Nine less than half the total number of newspapers delivered is twenty-seven newspapers.

### Suggested Answers

### Print Alternative

1. Write each of the following sentences as an equation.

a.  $12 - n = 4$

b.  $n + \frac{1}{2}n = 48$

c.  $3n - 2 = -7$

d.  $3 + m = 52$

e.  $2m + 5 = 79$

f.  $\frac{1}{2}n - 9 = 27$

### Computer Alternative



2. Do Introductory Lessons 5 and 6 of *BRITANNICA: Problem Solving in Algebra*.

2. Computer corrected

**Practice Activities**

Write an equation for each of these problems.

1. Six times a number plus ten equals forty. What is the number?  
1.  $6n + 10 = 40, n = 5$
2. A number increased by two and a half equals seven. What is the number?  
2.  $n + 2\frac{1}{2} = 7, n = 4\frac{1}{2}$
3. The price of six hockey tickets plus eight dollars for refreshments equals eighty dollars. How much did each hockey ticket cost?  
3.  $6n + 8 = 80, n = 12$
4. Chandia used an average of six sheets of loose-leaf paper each day. At the end of the semester she had used six hundred fifty-four sheets of paper. How many days long was the semester?  
4.  $6n = 654, n = 109$
5. Zaib now has thirty-seven tropical fish in his aquarium. This is seven less than four times the number of fish that he had when he started his aquarium. How many tropical fish did Zaib have at the start?  
5.  $4n - 7 = 37, n = 11$

**Suggested Answers**

Write an equation for each of these problems.

1. Six times a number plus ten equals forty. What is the number?  
1.  $6n + 10 = 40, n = 5$
2. A number increased by two and a half equals seven. What is the number?  
2.  $n + 2\frac{1}{2} = 7, n = 4\frac{1}{2}$
3. The price of six hockey tickets plus eight dollars for refreshments equals eighty dollars. How much did each hockey ticket cost?  
3.  $6n + 8 = 80, n = 12$
4. Chandia used an average of six sheets of loose-leaf paper each day. At the end of the semester she had used six hundred fifty-four sheets of paper. How many days long was the semester?  
4.  $6n = 654, n = 109$
5. Zaib now has thirty-seven tropical fish in his aquarium. This is seven less than four times the number of fish that he had when he started his aquarium. How many tropical fish did Zaib have at the start?  
5.  $4n - 7 = 37, n = 11$

## Concluding Activities

Translate the following. Use brackets where needed.

1. The square of nine, minus three, results in seventy-eight.

2. The square of, nine minus three, gives thirty-six.

3. The sum of eight and two, times a number is sixty.

4. The sum of eight, and two times a number equals twenty.

## Suggested Answers

1.  $9^2 - 3 = 78$

2.  $(9 - 3)^2 = 36$

3.  $n \times (8 + 2) = 60$ ,  $(8 + 2) \times n = 60$ ,  $n(8 + 2) = 60$ ,  
or  $(8 + 2)n = 60$ .

4.  $2n + 8 = 20$

# EQUATIONS

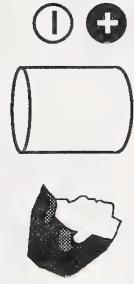
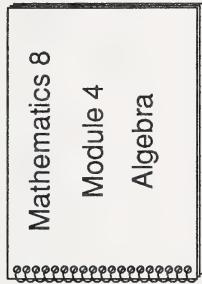
## What Lies Ahead

In this section the student will learn these skills.

- modelling equations
- solving equations by inspection or by using guess-check-revise methods
- verifying solutions by modelling the equation

## Gathering Materials

For this section the student will need these items.



*MATH MOVES: Equations—Solving With One Step (ACCESS)*  
(optional)

## Guiding the Student

- Emphasize to the students the goal of this section.
- Help the students decide what to do in this section.

- Help the students check their answers to the activities in this section and correct any errors.

**Introductory Activities**

1. a. Model  $a + 4 = 5$ .  
b. Solve the equation by inspection. (Find the value that makes the equation true.)  
c. Verify the solution. (Check to see if the equation is true for this value of the variable.)
  
2. a. Model  $b - 2 = -5$ .  
b. Solve the equation by inspection.  
c. Verify the solution.
  
3. a. Model  $2c = -6$ .  
b. Solve the equation by inspection.  
c. Verify the solution.
  
4. a. Model  $3d = 9$ .  
b. Solve the equation by inspection.  
c. Verify the solution.

**Suggested Activities**

Modelling and verifying is shown on pages 53 to 55.

1. b. By inspection you can see that  $a = 1$ .
  
2. b. By inspection you can see that  $b = -3$ .
  
3. b. By inspection you can see that  $c = -3$ .
  
4. b. By inspection you can see that  $d = 3$ .

5. a. Model  $2m + 1 = 7$ .  
b. Solve the equation by inspection.  
c. Verify the solution.

6. a. Model  $3x - 1 = 2$ .  
b. Solve the equation by inspection.  
c. Verify the solution.

7. a. Model  $3x - 8 = 16$ .  
b. Solve the equation by using the guess-check-revise method.  
c. Verify the solution.

8. a. Model  $4x = 2x + 6$ .  
b. Solve the equation by using the guess-check-revise method.  
c. Verify the solution.

5. b. By inspection you can see that  $m = +3$ .  
6. b. By inspection you can see that  $x = +1$ .  
7. b. By using the guess-check-revise method, you will find that  $x = 8$ .  
8. b. By using the guess-check-revise method, you will find that  $x = 3$ .

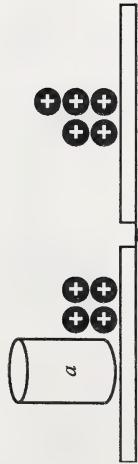
9. a. Model  $8 + 3x = 7x$ .  
b. Solve the equation by using the guess-check-revise method.  
c. Verify the solution.

10. a. Model  $4(n + 3) = 20$ .  
b. Solve the equation by using the guess-check-revise method.  
c. Verify the solution.

11. a. Model  $2x - 3 = 2 + 3x$ .  
b. Solve the equation by using the guess-check-revise method.  
c. Verify the solution.

**Modelling**

1. a. Model  $a + 4 = 5$ .



c. Verify  $a = 1$ .



2. a. Model  $b - 2 = -5$ .

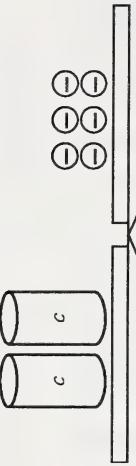


c. Verify  $b = -3$ .

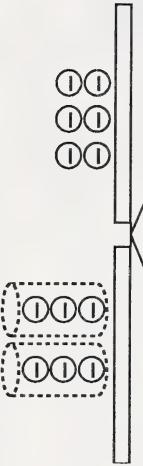


$$\text{LS} = \text{RS}$$

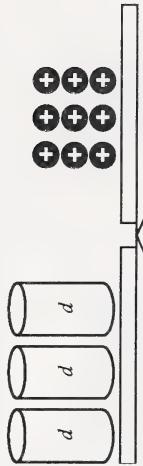
3. a. Model  $2c = -6$ .



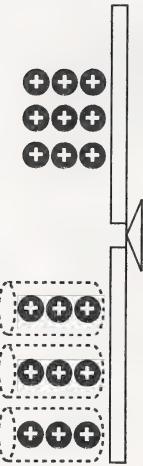
c. Verify  $c = -3$ .



4. a. Model  $3d = 9$ .



c. Verify  $d = 3$ .

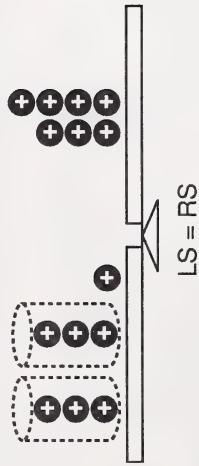


$$\text{LS} = \text{RS}$$

5. a. Model  $2m + 1 = 7$ .



c. Verify  $m = 3$ .

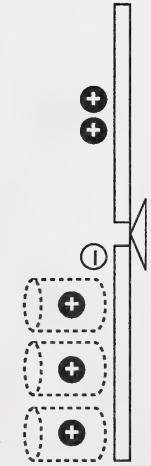


$$\text{LS} = \text{RS}$$

6. a. Model  $3x - 1 = 2$ .

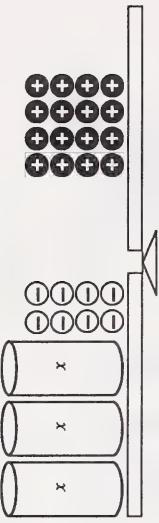


c. Verify  $x = +1$ .

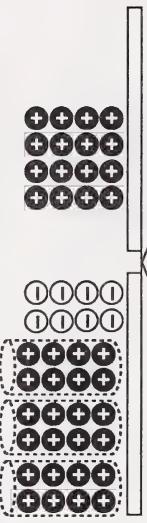


$$\text{LS} = \text{RS}$$

7. a. Model  $3x - 8 = 16$ .

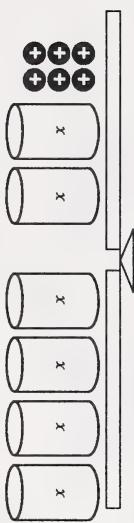


c. Verify  $x = +8$ .

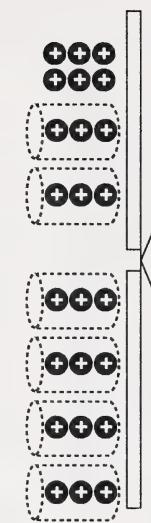


$$\text{LS} = \text{RS}$$

8. a. Model  $4x = 2x + 6$ .

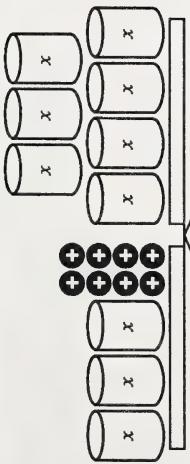


c. Verify  $x = 3$ .

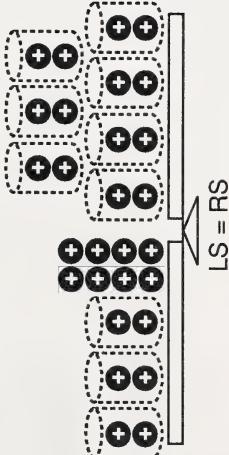


$$\text{LS} = \text{RS}$$

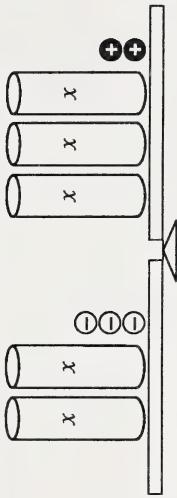
9. a. Model  $8 + 3x = 7x$ .



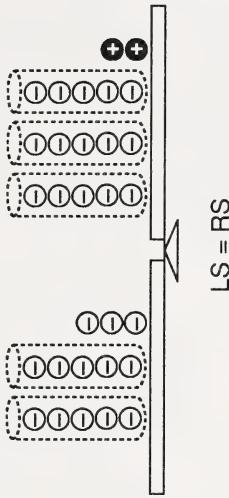
c. Verify  $x = 2$ .



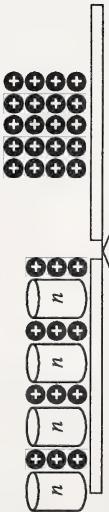
11. a. Model  $2x - 3 = 2 + 3x$ .



c. Verify  $x = -5$ .



10. a. Model  $4(n + 3) = 20$ .



c. Verify  $n = 2$ .



**Practice Activities**

Solve the following equations by using inspection or guess-check-revise methods. Do not use models.

1.  $n + 8 = 12$

2.  $p - 5 = -5$

3.  $4b = -4$

4.  $6 + x = 3$

5.  $3w + 8 = 5$

6.  $4t - 1 = 7$

7.  $5x + 4 = 4x + 10$

8.  $2(a - 7) = 4$

**Suggested Answers**

1.  $n = 4$

2.  $p = 0$

3.  $b = -1$

4.  $x = -3$

5.  $w = -1$

6.  $t = 2$

7.  $x = 6$

8.  $a = 9$

## Concluding Activities

### Suggested Answers

Solve the following equations by using inspection or guess-check-revise methods. Do not use models.

$$1. \frac{a}{3} = 5$$

$$2. \frac{b}{4} = 20$$

$$3. \frac{30}{c} = 6$$

$$4. \frac{r}{15} = \frac{1}{5}$$

$$5. \frac{10}{t} = \frac{2}{3}$$

$$1. a = 15$$

$$2. b = 80$$

$$3. c = 5$$

$$4. r = 3$$

$$5. t = 15$$



## SOLVING EQUATIONS USING ADDITIVE INVERSES

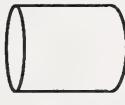
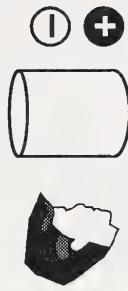
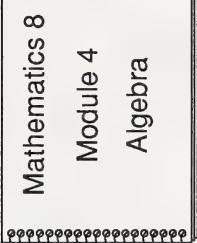
### What Lies Ahead

In this section the student will learn these skills.

- using learning aids and additive inverses to solve equations
- using a paper and pencil method and additive inverses to solve equations

### Gathering Materials

For this section the student will need these items.



*MATH MOVES: Equations—Solving  
With One Step (ACCESS)*  
(optional)

### Guiding the Student

- Emphasize to the students the goal of this section.
- Help the students decide what to do in this section.

- Help the students to check their answers to the activities in this section and correct any errors.

## Introductory Activities

### Suggested Answers

Model these equations and solve the equations by isolating the variable. Be sure to verify your solutions.

$$1. \quad n + 7 = 9$$

$$2. \quad b - 2 = 6$$

$$3. \quad y - 1 = 1$$

$$4. \quad q - 4 = -7$$

$$5. \quad 7 = m - 5$$

$$1. \quad n = +2$$

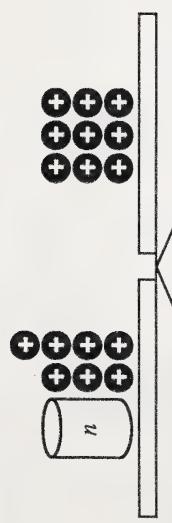
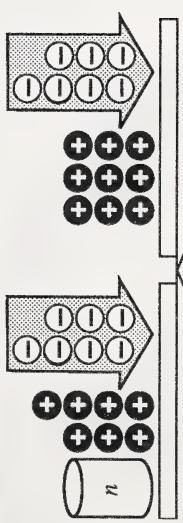
$$2. \quad b = +8$$

$$3. \quad y = +2$$

$$4. \quad q = -3$$

$$5. \quad m = +12$$

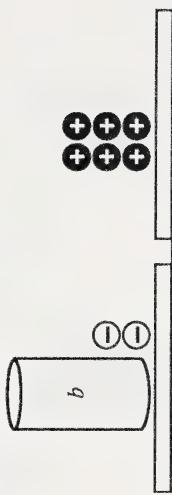
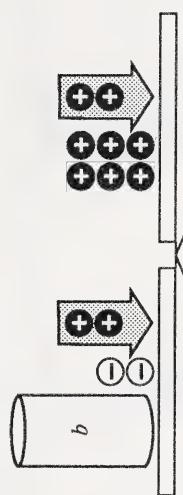
Modelling and verifying is shown on the next page.

**Modelling**1. Model  $n + 7 = 9$ .Add  $-7$  to each side.

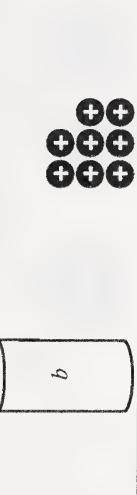
Remove the zero pairs.

Verify  $n = +2$ .

$$\text{LS} = \text{RS}$$

2. Model  $b - 2 = 6$ .Add  $+2$  to each side.

Remove the zero pairs.

Verify  $b = +8$ .

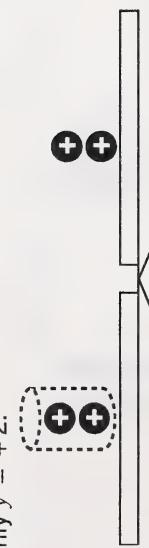
$$\text{LS} = \text{RS}$$

3. Model  $y - 1 = 1$ .

Add +1 to each side.



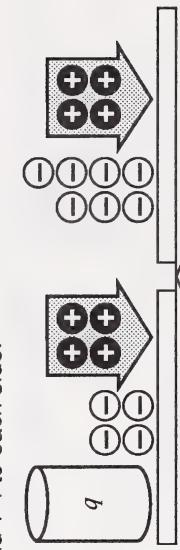
Remove the zero pairs.

Verify  $y = +2$ .

$$\text{LS} = \text{RS}$$

4. Model  $q - 4 = -7$ .

Add +4 to each side.

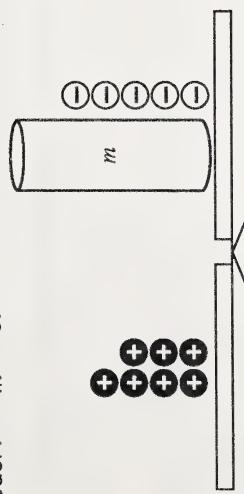


Remove the zero pairs.

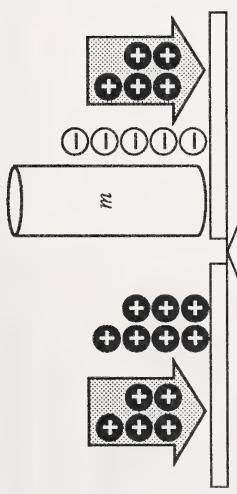
Verify  $q = -3$ .

$$\text{LS} = \text{RS}$$

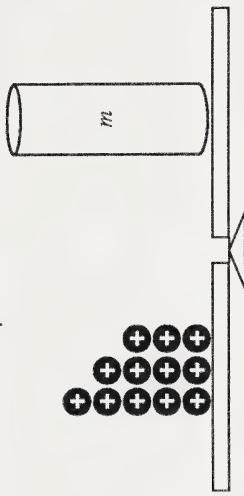
5. Model 7 =  $m - 5$ .



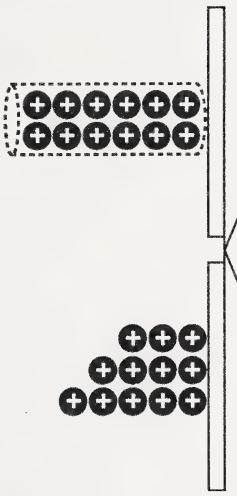
Add +5 to each side.



Remove the zero pairs.



Verify  $m = 12$ .



LS = RS

**Practice Activities****Suggested Answers**

1. What numbers should be added to both sides to isolate the variable?

a.  $x + 2 = 7$

1. a.  $-2$

b.  $s + 4 = 9$

b.  $-4$

c.  $m + 9 = -13$

c.  $-9$

d.  $t - 5 = 7$

d.  $+5$

e.  $y - 2 = -8$

e.  $+2$

2. Solve the equations in Question 1 using paper and pencil methods. Verify your solutions.

2. a.  $x = 5$

b.  $s = 5$

c.  $m = 4$

d.  $t = 12$

e.  $y = -6$

**Extra Practice**

Use flow charts and inverse flow charts to solve these equations.

1.  $s - 3 = 5$

2.  $k + 12 = 39$

3.  $2 + m = 8$

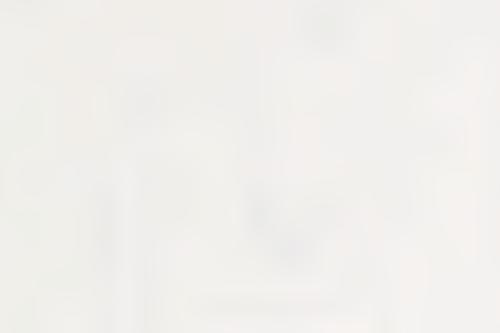
4.  $s - 4 = 3$

1.  $s = 8$

2.  $k = 27$

3.  $m = 6$

4.  $s = 7$

**Suggested Answers**

**Concluding Activities**

Solve these equations using a paper and pencil method. Verify your solutions.

1.  $x + 225 = 5$

2.  $n - 8.5 = 12.3$

3.  $q - \frac{1}{2} = \frac{3}{4}$

4.  $p + 7.5 = 8.2$

5.  $m - 5\frac{3}{4} = 3\frac{1}{4}$

6.  $s - 383 = 117$

**Suggested Answers**

1.  $x = -220$

2.  $n = 20.8$

3.  $q = 1\frac{1}{4}$

4.  $p = 0.7$

5.  $m = 9$

6.  $s = 500$

## SOLVING EQUATIONS USING MULTIPLICATIVE INVERSES

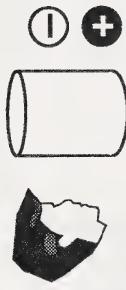
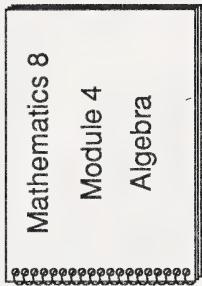
### What Lies Ahead

In this section the student will learn these skills.

- using learning aids and multiplicative inverses to solve equations
- using paper and pencil methods and multiplicative inverses to solve equations

### Gathering Materials

For this section the student will need these items.



*MATH MOVES: Equations—Solving With One Step (ACCESS)*

(optional)

### Guiding the Student

- Emphasize to the students the goal of this section.
- Help the students decide what to do in this section.

- Help the students to check their answers to the activities in this section and correct any errors.

**Introductory Activities**

Model these equations and solve the equations by isolating the variable. Be sure to verify your solutions.

1.  $2y = 6$

2.  $2x = 6$

3.  $2t = -2$

4.  $3w = 12$

5.  $10 = 5t$

**Suggested Answers**

Modelling is shown on the next page.

1.  $y = 3$

2.  $x = 3$

3.  $t = -1$

4.  $w = 4$

5.  $t = 2$

**Modelling**

1. Model  $2y = 6$ .

Divide each side into 2 groups.

Verify  $y = +3$ .

$\text{LS} = \text{RS}$

2. Model  $2x = 6$  the same way as you did  $2y = 6$  in Question 1.

3. Model  $2t = -2$  and divide each side into 2 groups.

Verify  $t = -1$ .

$\text{LS} = \text{RS}$

4. Model  $3w = 12$  and divide each side into 3 groups.

Verify  $w = 4$ .

$\text{LS} = \text{RS}$

5. Model  $10 = 5t$  and divide each side into 5 groups.

Verify  $t = 2$ .

$\text{LS} = \text{RS}$

**Practice Activities****Suggested Answers**

1. What number should both sides be divided by to isolate the variable?

a.  $2y = 18$

1. a. 2

b.  $4v = 32$

b. 4

c.  $3m = -9$

c. 3

d.  $-2f = -4$

d. -2

e.  $5y = -10$

e. 5

2. Solve the equations in Question 1 by using paper and pencil methods. Verify your solutions.

b.  $v = 8$

c.  $m = -3$

d.  $f = 2$

e.  $y = -2$

**Extra Practice**

Use flow charts and inverse flow charts to solve these equations.

1.  $9t = -72$

2.  $3t = 30$

3.  $44 = 4n$

4.  $-10 = 2w$

**Suggested Answers**

1.  $t = -8$

2.  $t = 10$

3.  $n = 11$

4.  $w = -5$

**Concluding Activities**

Solve the equations using a paper and pencil method. Verify the solutions.

1.  $4t = 6$

2.  $3a = \frac{1}{2}$

3.  $2r = \frac{3}{4}$

4.  $2p = 14.4$

5.  $3m = 0.9$

**Suggested Answers**

1.  $t = 1\frac{1}{2}$

2.  $a = \frac{1}{6}$

3.  $r = \frac{3}{8}$

4.  $p = 7.2$

5.  $m = 0.3$

## SOLVING MORE EQUATIONS USING MULTIPLICATIVE INVERSES

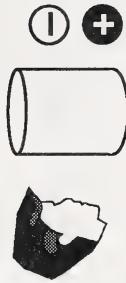
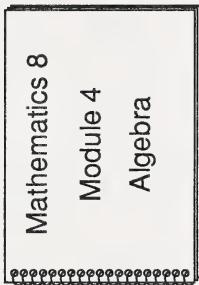
### What Lies Ahead

In this section the student will learn these skills.

- using learning aids and multiplicative inverses to solve more equations
- using paper and pencil methods and multiplicative inverses to solve more equations
- using clearing-denominator methods and cross-product methods to solve equations

### Gathering Materials

For this section the student will need these items.



### Guiding the Student

- Emphasize to the students the goal of this section.
- Help the students decide what to do in this section.
- Help the students to check their answers to the activities in this section and correct any errors.

**Introductory Activities****Suggested Answers**

1. Solve the following equations by using models. Be sure to verify each solution.

a.  $\frac{n}{5} = 6$

a.  $n = 30$

b.  $\frac{q}{11} = 3$

b.  $q = 33$

c.  $\frac{r}{2} = -12$

c.  $r = -24$

d.  $\frac{p}{8} = 2$

d.  $p = 16$

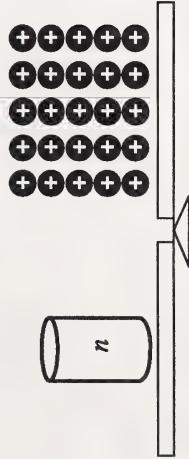
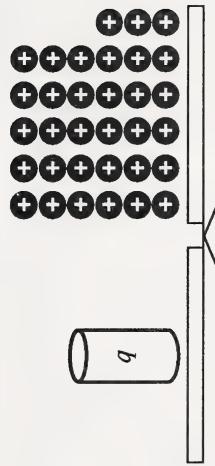
e.  $\frac{b}{7} = -1$

e.  $b = -7$

2. Solve the equations in Question 1 using paper and pencil methods.

1. Modelling and verifying is shown on the next page.

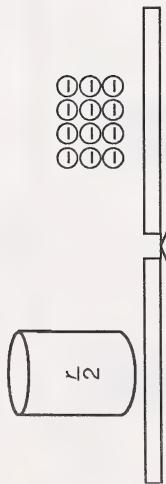
2. The answers will be the same as those found in Question 1.

**Modelling**a. Model  $\frac{n}{5} = 6$ .b. Model  $\frac{q}{11} = 3$ .Multiply each side by 5, and replace five  $\frac{n}{5}$  with  $n$ .Multiply each side by 11, and replace eleven  $\frac{q}{11}$  with  $q$ .Verify  $n = 30$  and  $\frac{n}{5} = 6$ .Verify  $q = 33$  and  $\frac{q}{11} = 3$ .

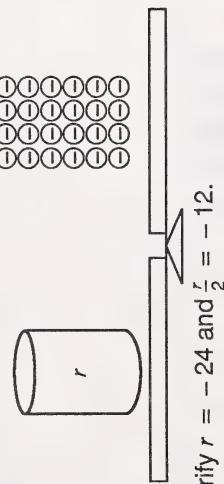
$$\text{LS} = \text{RS}$$

$$\text{LS} = \text{RS}$$

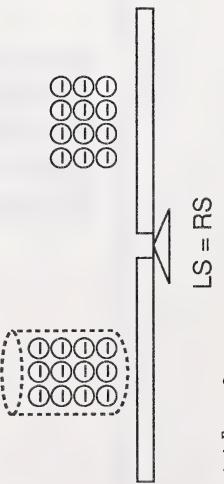
c. Model  $\frac{r}{2} = -12$ .



Multiply each side by 2, and replace two  $\frac{r}{2}$  with  $r$ .



Verify  $r = -24$  and  $\frac{r}{2} = -12$ .



$$\text{LS} = \text{RS}$$

d. Model  $\frac{p}{8} = 2$ .



Multiply each side by 8, and replace eight  $\frac{p}{8}$  by  $p$ .

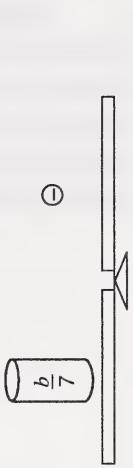


Verify  $p = 16$  and  $\frac{p}{8} = 2$ .

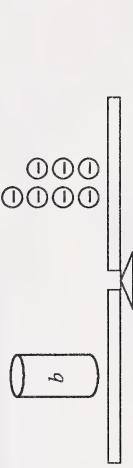


$$\text{LS} = \text{RS}$$

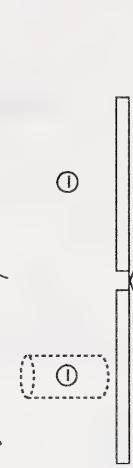
e. Model  $\frac{b}{7} = -1$ .



Multiply each side by 7, and replace seven  $\frac{b}{7}$  with  $b$ .



$$\text{Verify } b = -7 \text{ and } \frac{b}{7} = -1.$$



$$\text{LS} = \text{RS}$$

**Practice Activities****Suggested Answers**

1. What number should both sides of the equation be multiplied by to isolate the variable?

a.  $\frac{n}{15} = \frac{2}{3}$

1. a. 15

b.  $\frac{f}{9} = \frac{8}{3}$

b. 9

c.  $\frac{y}{5} = \frac{30}{36}$

c. 5

d.  $\frac{z}{7} = \frac{5}{8}$

d. 7

e.  $\frac{3}{4} = \frac{c}{20}$

e. 20

2. Solve the equations in Question 1. Verify your solutions.

2. a.  $n = 10$

b.  $f = 24$

c.  $y = 4\frac{1}{6}$

d.  $r = 4\frac{3}{8}$

e.  $c = 15$

**Extra Practice**

Use flow charts and inverse flow charts to solve these equations.

$$1. \quad \frac{a}{3} = 2$$

$$2. \quad \frac{b}{4} = 16$$

$$3. \quad \frac{c}{2} = \frac{3}{4}$$

$$4. \quad \frac{d}{5} = \frac{8}{25}$$

**Suggested Answers**

$$1. \quad a = 6$$

$$2. \quad b = 64$$

$$3. \quad c = 1\frac{1}{2}$$

$$4. \quad c = 1\frac{3}{5}$$

## Concluding Activities

Solve the following equations by clearing the denominators or by using cross products. Be sure to verify your solutions.

$$1. \quad \frac{h}{7} = \frac{5}{2}$$

$$2. \quad \frac{5}{t} = \frac{9}{8}$$

$$3. \quad \frac{n}{2} = \frac{1}{4}$$

$$4. \quad \frac{4}{m} = \frac{1}{3}$$

$$5. \quad \frac{w}{6} = \frac{1}{3}$$

## Suggested Answers

$$1. \quad h = 17\frac{1}{2}$$

$$2. \quad t = 4\frac{4}{9}$$

$$3. \quad n = \frac{1}{2}$$

$$4. \quad m = 12$$

$$5. \quad w = 2$$



## SOLVING EQUATIONS USING ADDITIVE AND MULTIPLICATIVE INVERSES

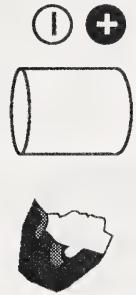
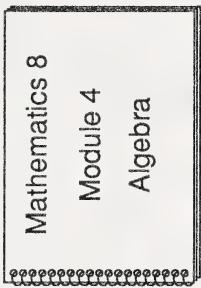
### What Lies Ahead

In this section the student will learn these skills.

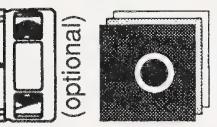
- solving more complex equations using learning aids
- solving more complex equations using a procedure with paper and pencil

### Gathering Materials

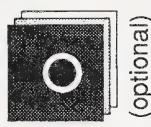
For this section the student will need these items.



Mathematics 8  
Module 4  
Algebra



MATH MOVES: Equations—Solving  
With More Than One Step (ACCESS)  
(optional)



Computer Drill and Instruction:  
Mathematics, Level D (SRA)

(optional)

### Guiding the Student

- Emphasize to the students the goal of this section.
- Help the students decide what to do in this section.

- Help the students to check their answers to the activities in this section and correct any errors.

## Introductory Activities

Model these equations by isolating the variable. Be sure to verify your solutions.

1.  $3q - 3 = 6$

2.  $3y + 4 = 13$

3.  $2b + 6 = 12$

4.  $p + 3p = 8$

5.  $5k - 2k = 6$

## Suggested Answers

Modelling is shown on the next page.

1.  $q = +3$

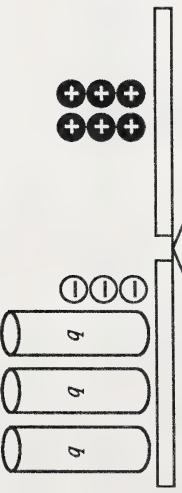
2.  $y = +3$

3.  $b = +3$

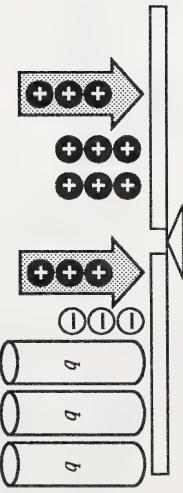
4.  $p = +2$

5.  $k = +2$

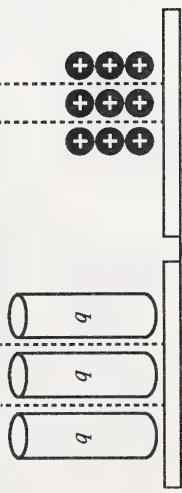
1. Model  $3q - 3 = 6$ .



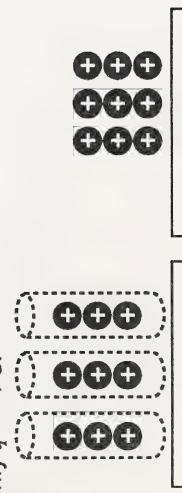
Add +3 to each side.



Remove the zero pairs and then divide each side into 3 groups.

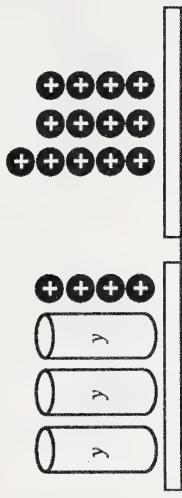


Verify  $q = +3$ .

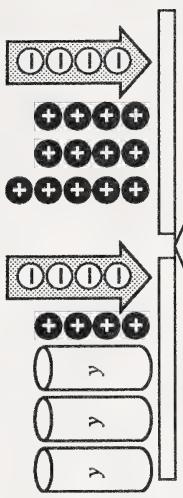


$LS = RS$

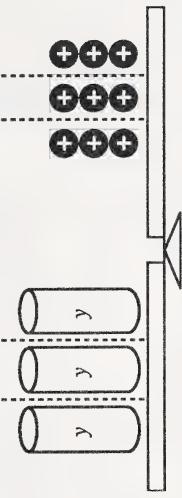
2. Model  $3y + 4 = 13$ .



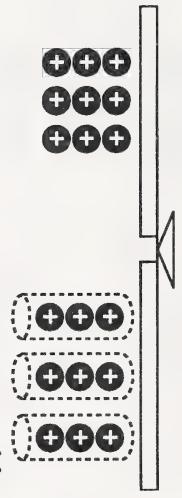
Add -4 to each side.



Remove the zero pairs and divide each side into 3 groups.

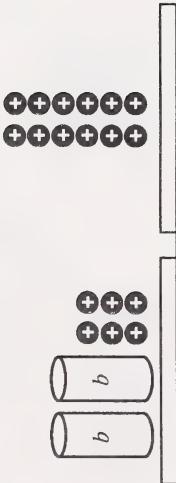


Verify  $y = +3$ .

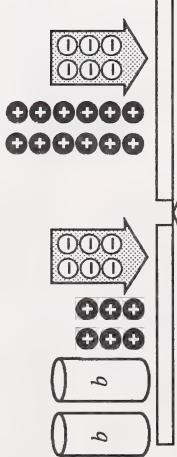


$LS = RS$

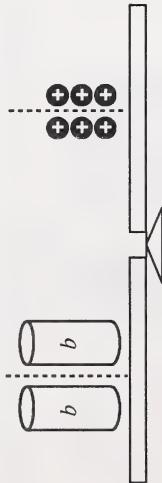
3. Model  $2b + 6 = 12$ .



Remove the zero pairs and divide each side into 2 groups.

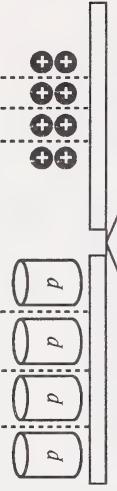


Verify  $b = +3$ .



$$\text{LS} = \text{RS}$$

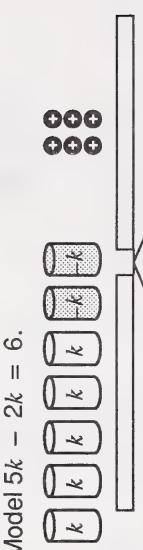
4. Model  $p + 3p = 8$  and divide each side into 4 groups.



Verify  $p = +2$ .



5. Model  $5k - 2k = 6$ .



Remove the zero pairs and divide each side into 3 groups.



Verify  $k = +2$  and  $-k = -2$ .



$$\text{LS} = \text{RS}$$

**Practice Activities****Computer Alternative**

1. Do Lesson 8 and Lesson 10 on the disk *Pre-Algebra* from the package *Computer Drill and Instruction: Mathematics, Level D* (SRA).

**Print Alternative**

2. Solve the equations by using a paper and pencil method. Be sure to verify your solutions.



- a.  $5x + 6 = 31$
- b.  $6x - 3 = 15$
- c.  $8a + 6 = 22$
- d.  $3c - 3 = -24$
- e.  $11n + 44 = 0$

1. Computer corrected
2. a.  $x = 5$
- b.  $x = 3$
- c.  $a = 2$
- d.  $c = -7$
- e.  $n = -4$

3. Solve the following conditions. Place the letter that goes with each condition below the solution in the boxes below.

A  $8y - 5y = 30$

L  $4a + 2a + 3a = 18$

V  $3x + 5x - 2x = 36$

T  $9b - 4b + 2b = 77$

E  $10c + 4c - 6c = 64$

H  $4m + 3m = 84$

O  $8x + 2x - 2 = 28$

I  $12y - 11y = 8 - 3$

M  $-10a + 5a + 7 - 5 = -33$

3.  $y = 10$

a = 2

x = 6

b = 11

c = 8

m = 12

x = 3

y = 5

a = 7

5	4	2	3	6	8	9	7	10	11	12
I	L	O	V	E		M	A	T	H	

**Extra Practice****Suggested Answers**

Solve the following equations using flow charts and inverse flow charts. Use your calculator to help you if you wish.

1.  $3a - 2 = 7$       1.  $a = 3$

2.  $2b + 1 = -9$       2.  $b = -5$

3.  $3c - 4 = 5$       3.  $c = 3$

4.  $4b - 1 = -9$       4.  $b = -2$

5.  $2d + 1 = 5$       5.  $d = 2$

## Concluding Activities

### Suggested Answers

Solve the following equations by using additive and multiplicative inverses. Verify the solutions.

1.  $2a + \frac{1}{2} = \frac{3}{4}$       1.  $a = \frac{1}{8}$

2.  $3b - 1 = 8.3$       2.  $b = 3.1$

3.  $5c + 1.5 = -10$       3.  $c = 2.3$

4.  $2.5 = 1 + 3d$       4.  $d = 0.5$

5.  $t + 1 + 3t = 9$       5.  $t = 2$

# EQUATIONS WITH TWO VARIABLES

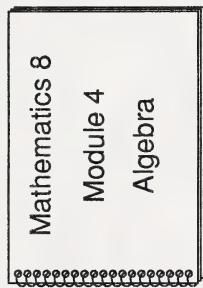
## What Lies Ahead

In this section the student will learn these skills.

- modelling equations with two variables
- making a table of values for equations with two variables
- graphing equations

## Gathering Materials

For this section the student will need these items.



## Guiding the Student

- Emphasize to the students the goal of this section.
- Help the students decide what to do in this section.

- Help the students check their answers to the activities in this section and correct any errors.

## Introductory Activities

For each of the equations do the following.

- Use inspection or guess-check-revise methods to find three solutions.
- Write the solutions as ordered pairs.

- Verify the solutions with models.

1.  $y = 3x$

2.  $y = x - 1$

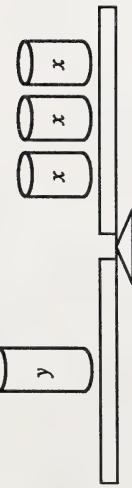
3.  $y = 2x + 1$

## Suggested Answers

Models are shown on the next page.

1.  $(0, 0), (1, 3), (2, 6), (3, 9), (4, 12), \dots$
2.  $(0, -1), (1, 0), (2, 1), (3, 2), (4, 3), \dots$
3.  $(0, 1), (1, 3), (2, 5), (3, 7), (4, 9), \dots$

1. Model  $y = 3x$ .

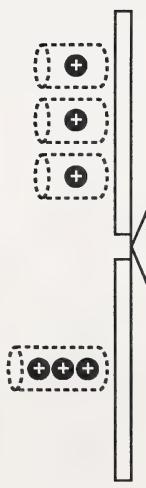


Verify that the solution is  $(0, 0)$ .



$$\text{LS} = \text{RS}$$

Verify that the solution is  $(1, 3)$ .



$$\text{LS} = \text{RS}$$

The other ordered pairs are verified in a similar manner.

Verify that the solution is  $(0, -1)$ .



$$\text{LS} = \text{RS}$$

The other ordered pairs are verified in a similar manner.

3. Model  $y = 2x + 1$ .



Verify that the solution is  $(0, 1)$ .



2. Model  $y = x - 1$ .



The other ordered pairs are verified in a similar manner.

**Practice Activities**

1. Complete the following tables of values.

a.

$y = 2x$	
$x$	$y$
-3	
0	
3	
6	

a.

$y = 2x$	
$x$	$y$
-3	-6
0	0
3	6
6	12

**Suggested Answers**

1.

1. Complete the following tables of values.

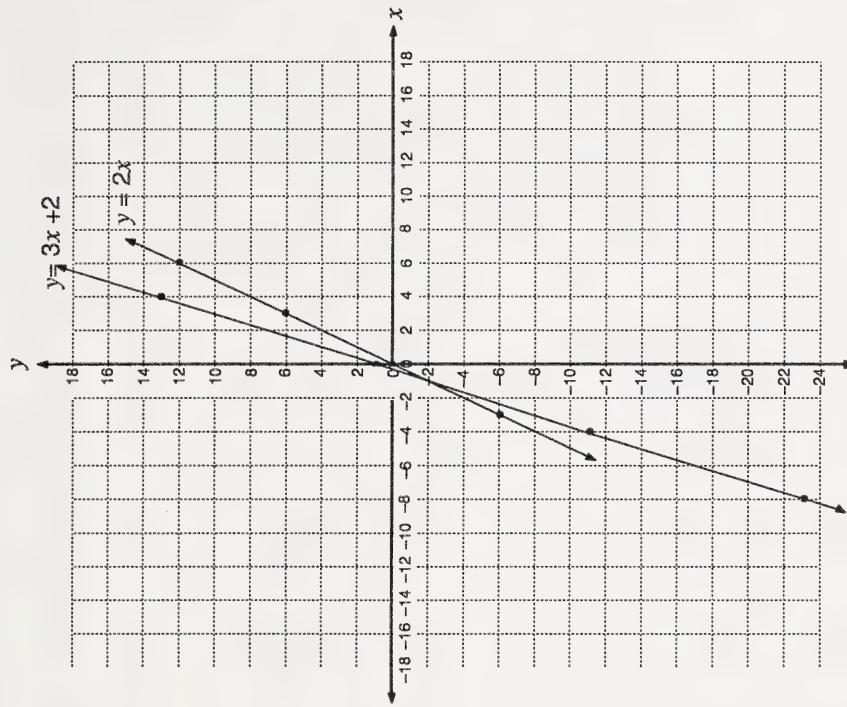
b.

$y = 3x + 1$	
$x$	$y$
-8	-23
-4	-11
0	1
4	13

b.

$y = 3x + 1$	
$x$	$y$
-8	-23
-4	-11
0	1
4	13

2. Graph the equations from Question 1.



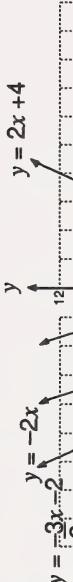
## Concluding Activities

### Suggested Answers

- Find the answer to the riddle by completing the worksheet on the following page.<sup>1</sup>
- Graph each of the equations from Question 1 on the grid at the right.
- What do you notice about the graphs of all the equations in Question 1?

2.  $y = -\frac{3}{2}x - 2$

$y = 2x + 4$



- What do you notice about the graphs of all the equations in Question 1?



$y = \frac{1}{2}x - 4$

$y = -x + 6$

$y = -x + 1$

$y = -3x + 7$

- All the graphs are of straight lines. The graphs of equations with positive coefficients slant from top right to bottom left. The graphs of equations with negative coefficients slant from top left to bottom right.

<sup>1</sup>1982 Creative Publications, Sunnyvale, California 94086 for excerpt from *Algebra With Pizzazz*.

## WHY DID ZORNA POUR KETCHUP ON HER BROTHER'S HAND?

Complete the table for each equation. Find each answer in the code key and notice the letter next to it. Write this letter in the box at the bottom of the page that contains the circled number in that row of the table.

$$y = -2x$$

$x$	$y$
1	-2 (1)
4	-8 (2)
-5	10 (3)
3	-6 (4)

$$y = 2x + 4$$

$x$	$y$
3	10 (5)
-7	-10 (6)
1	6 (7)
-3	-2 (8)

$$y = -3x + 1$$

$x$	$y$
3	-8 (9)
-3	10 (10)
4	-11 (11)
-2	7 (12)

$$y = \frac{1}{2}x - 4$$

$x$	$y$
3	1 (13)
-2	-5 (14)
4	-2 (15)
-8	-8 (16)

### CODE KEY

13

L

10

R

7

A

6

T

4

P

3

M

2

W

1

I

0

N

-2

H

-5

D

-6

B

-8

E

-10

O

-11

S

$$y = -x + 1$$

$$y = -3x + 7$$

$$y = -\frac{3}{2}x - 2$$

$$y = -x + 6$$

$x$	$y$
6	-11 (25)
1	4 (26)
0	7 (27)
-2	13 (28)

$x$	$y$
-2	3 (29)
-9	10 (30)
9	-8 (31)
6	-5 (32)

$x$	$y$
4	2 (17)
-1	7 (18)
6	0 (19)
0	6 (20)

13	L
10	R
7	A
6	T
4	P
3	M
2	W
1	I
0	N
-2	H
-5	D
-6	B
-8	E
-10	O
-11	S

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32
H	E	R	B	R	O	T	H	E	R	S	A	I	D	H	E	W	A	N	T	E	D	H	I	S	P	A	L	M	R	E	D



# RELATIONS

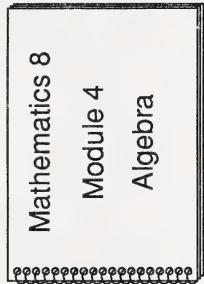
## What Lies Ahead

In this section the student will learn these skills.

- describing a relation using a table, a rule, ordered pairs, and a graph
- finding missing terms in a sequence

## Gathering Materials

For this section the student will need these items.

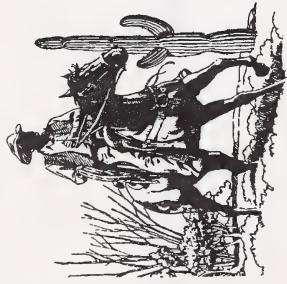


## Guiding the Student

- Emphasize to the students the goal of this section.
- Help the students decide what to do in this section.
- Help the students check their answers to the activities in this section and correct any errors.

**Practice Activities****Suggested Answers**

1. Santini likes to go horseback riding. How is the cost related to the riding time?



Riding Time in Hours ( $t$ )	Relation	Cost in Dollars ( $c$ )
1	$4 + 2 \times 1$	6
2	$4 + 2 \times 2$	8
3	$4 + 2 \times 3$	10
4	$4 + 2 \times 4$	12
5	$4 + 2 \times 5$	14

Describe the relationship by using each of the following methods.

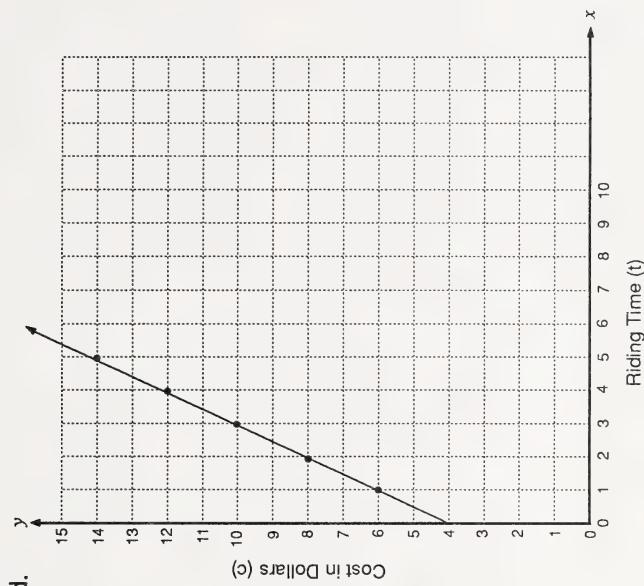
- Write the words to describe the relation.
- Write an equation to describe the relation.
  - $c = 4 + 2t$
  - Two times the riding time plus four equals the cost.

c. Write ordered pairs to describe the relation.

c.  $(1, 6), (2, 8), (3, 10), (4, 12), (5, 14), \dots$

d. Describe the relationship using a graph.

d.



2. How is Rajah's hourly pay related to Nadia's hourly pay?



Nadia's Pay ( $f$ )	Relation	Rajah's Pay ( $g$ )
5	$5 - 1$	4
6	$6 - 1$	5
7	$7 - 1$	6
8	$8 - 1$	7
9	$9 - 1$	8

Describe the relationship several ways by using each of the following methods.

- Write words to describe the relation.
- Write an equation to describe the relation.

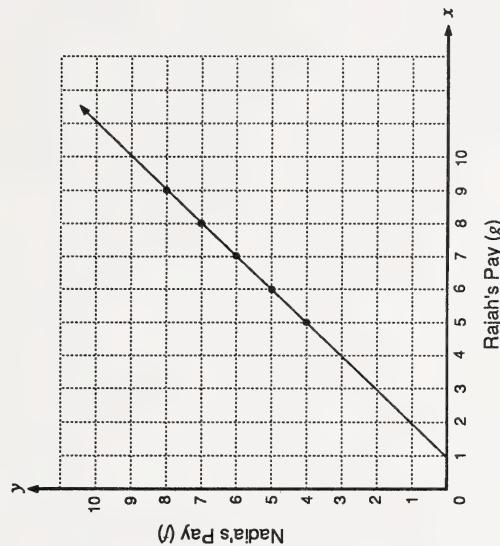
b.  $g = f - 1$

c. Write ordered pairs to describe the relation.

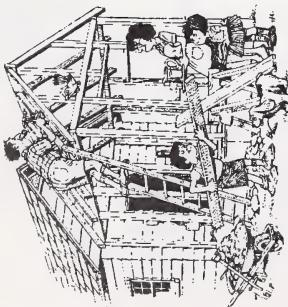
c.  $(5, 4), (6, 5), (7, 6), (8, 7), (9, 8), \dots$

d. Use a graph to describe the relation.

d.



3. How is the length (in metres) of the new room related to the width (in metres) of the new room?



Width in Metres ( $w$ )	Relation	Length in Metres ( $\ell$ )
1	$2 \times 1 + 3$	5
2	$2 \times 2 + 3$	7
3	$2 \times 3 + 3$	9
4	$2 \times 4 + 3$	11
5	$2 \times 5 + 3$	13

Describe the relationship by using each of the following methods.

- Describe the relation using words.
- Describe the relation using an equation.

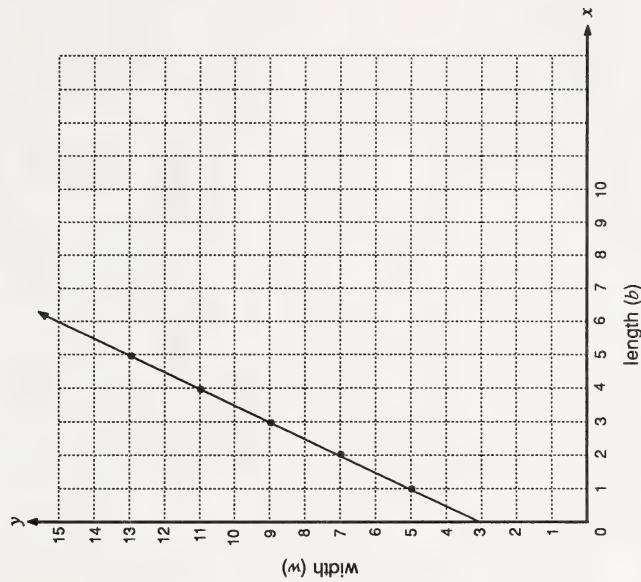
3. a. Two times the width plus three metres equals the length.  
b.  $\ell = 2w + 3$

c. Describe the relation using ordered pairs.

c.  $(1, 5), (2, 7), (3, 9), (4, 11), (5, 13), \dots$

d. Describe the relation using a graph.

d.



## Concluding Activities

### Suggested Answers

1. a. What are the next three terms of the following sequence?

5, 6, 7, 8, , ,

b. Find the fiftieth term of the above sequence.

1. a. ..., 9, 10, 11

b.	Term	Relation	Number
1		$1 + 4$	5
2		$2 + 4$	6
3		$3 + 4$	7
4		$4 + 4$	8

The relation  
is  $n + 4$ .

2. a. What are the next three terms of the following sequence?  
6, 9, 12, 15, , ,

b. Find the fiftieth term of the above sequence.

Evaluate  $n + 4$  if  $n = 50$ .

$$50 + 4 = 54$$

The fiftieth term is 54.

2. a. ..., 18, 21, 24

b.	Term	Relation	Number
1		$(1 + 1) \times 3$	6
2		$(2 + 1) \times 3$	9
3		$(3 + 1) \times 3$	12
4		$(4 + 1) \times 3$	15

The relation  
is  $(n + 1) \times 3$ .

Evaluate  $(n + 1) \times 3$  if  $n = 50$ .  
 $(50 + 1) \times 3 = 153$

The fiftieth term is 153.

3. a. What are the next three terms of the following sequence?

$$8, 16, 24, 32, 40, \square, \square, \square$$

b. Find the fiftieth term of the above sequence.

3. a. ..., 48, 56, 64

Term	Relation	Number
1	$1 \times 8$	8
2	$2 \times 8$	16
3	$3 \times 8$	24
4	$4 \times 8$	32
5	$5 \times 8$	40

Evaluate  $n \times 8$  if  $n = 50$ .

$$50 \times 8 = 400$$

The fiftieth term is 400.





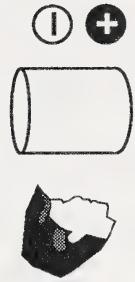
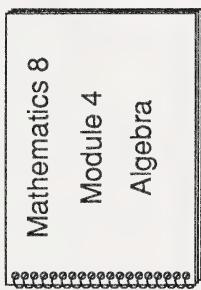
## SUMMARY

### What Lies Ahead

In this section the student will review the skills learned in Module 4.

### Gathering Materials

For this section the student will need these items.



- Emphasize to the students the goal of this section.
- Help the students check their answers to the pretest in Section 1.

### Guiding the Student

- Emphasize to the students the goal of this section.
- Help the students check their answers to the pretest in Section 1.



## MODULE CONCLUSION

### What Lies Ahead

In this section the student will complete the module assignment.

Mathematics 8  
Module 4  
Algebra



### Gathering Materials

For this section the student will need these items.

Assignment  
Booklet

### Guiding the Student

- Emphasize to the students the goal of this section is to assess what the student has learned.
- Give each student a grade and feedback to the assignments.

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**Suggested Answers to Assignment Booklet****Part 1: Multiple-Choice Questions**

Each of the following questions has four suggested answers, one of which is better than the others. Place the letter of the best answer in the blank on the response page at the right.

1. Which phrase is represented by  $2n - 3$ ?
  - A. two times, a number minus three
  - B. three less than one-half of a number
  - C. two times a number, minus three
  - D. three less than two, times a number
  
2. Which phrase is represented by  $2(n + 3)$ ?
  - A. three more than, a number multiplied by two
  - B. the product of two and a number, increased by three
  - C. three more than a number, increased by two
  - D. the product of two, and a number increased by three
  
3. Which phrase does **not** mean  $3c^2 - 5$ ?
  - A. five less than, three times the square of a number
  - B. the square of 3 times a number, decreased by five
  - C. five less than, triple the square of a number
  - D. three times the square of a number, diminished by five
  
4. Which number is the value of  $18t$  if  $t = 3$ ?
  - A. 6
  - B. 15
  - C. 54
  - D. 183
  
5. Which number is the value of  $3x - 2$  if  $x = 4$ ?
  - A. 5
  - B. 6
  - C. 10
  - D. 32

**Part 1 Response Page**1. C2. D3. B4. C5. C

**Part 1 (continued)**

6. If  $s = 2$  and  $t = 3$ , which number is the value of  $3s - 8t$ ?

A. - 51  
B. - 5  
C. - 18  
D. - 30

7. If you simplify  $5a + 4b - 2a + 3b$ , which expression do you have?

A.  $9a - b$   
B.  $3a + 7b$   
C.  $3a - 7b$   
D.  $7a - b$

8. Which expression **cannot** be simplified further?

A.  $5x + 3y + x - y$   
B.  $7x - 3z + 4x - 6$   
C.  $6x + y + z - 1$   
D.  $5x + 2y + 7 - 2$

9. Which equation represents “twelve less than a number is seven”?

A.  $b - 12 = 7$   
B.  $12 = b - 7$   
C.  $12 - 7 = b$   
D.  $12 - b = 7$

10. Which equation represents “a number increased by three is seven”?

A.  $3 + 7 = n$   
B.  $3n = 7$   
C.  $3 + n = 7$   
D.  $n = 3 \times 7$

**Part 1 Response Page (continued)**6. C7. B8. C9. B10. C

**Part 1 (continued)**

11. Which equation has the solution  $m = 2$ ?

- A.  $5m - 2 = 5$
- B.  $5m - 1 = 9$
- C.  $\frac{m}{5} - 4 = 3$
- D.  $4m - 9 = 1$

12. Which equation does not have the solution  $p = 3$ ?

- A.  $2p - 5 = 1$
- B.  $7p + \frac{1}{2} = \frac{43}{2}$
- C.  $2p + 5 = 1$
- D.  $\frac{p}{3} - 1 = 0$

13. In solving the equation  $n + 5 = 17$  using paper and pencil methods, which step is correct?

- A. Add 5 to each side of the equation.
- B. Add  $-5$  to each side of the equation.
- C. Multiply each side of the equation by 5.
- D. Multiply each side of the equation by  $\frac{1}{5}$ .

14. In solving the equation  $3a = 9$  using paper and pencil methods, which step is correct?

- A. Add 3 to each side of the equation.
- B. Add  $-3$  to each side of the equation.
- C. Multiply each side of the equation by 3.
- D. Multiply each side of the equation by  $\frac{1}{3}$ .

**Part 1 Response Page (continued)**11. B12. C13. B14. D

**Part 1 (continued)**

15. Which equation can be solved using these operations on each side? Add 5; then multiply by  $\frac{1}{3}$ .

A.  $3(n - 5) = 6$   
B.  $3n - 5 = 31$   
C.  $3n + 5n = 24$   
D.  $3n + 5 = 17$

16. Which equation has the correct solution given?

A.  $\frac{n}{3} = 5, n = 7\frac{1}{2}$   
B.  $\frac{a}{2} = \frac{9}{5}, a = 7$   
C.  $5s + 2s = 42, s = 7$   
D.  $\frac{5}{c} = \frac{2}{3}, c = 7\frac{1}{2}$

17. Which order pair is **not** a solution to the equation  $m = 2n$ ?

A. (1, 2)  
B. (4, 9)  
C. (3, 6)  
D. (5, 10)

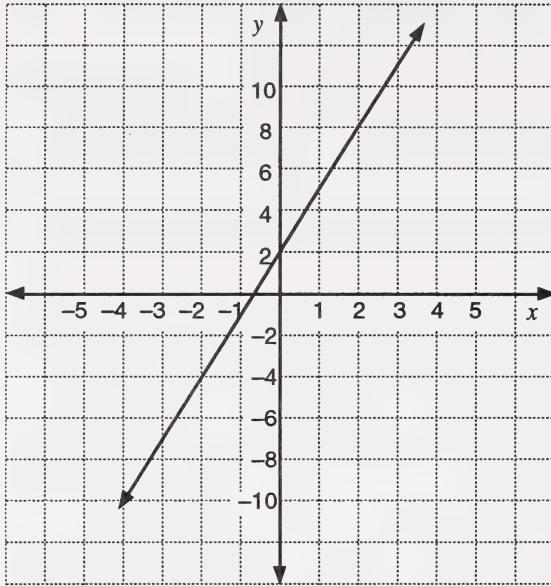
18. Which ordered pair comes next in this sequence?  
 $(0, -1), (1, 1), (2, 3), (3, 5), \dots$

A. (4, 6)  
B. (4, 7)  
C. (4, 8)  
D. (4, 9)

**Part 1 Response Page (continued)**15. B16. D17. B18. B

**Part 1 (continued)**

19. Which equation is shown in the graph?



- A.  $y = x + 2$
- B.  $y = 2x + 2$
- C.  $y = 3x + 2$
- D.  $y = 2x + 3$

20. Which ordered pair fits this table?

$x$	7	12	2	10
$y$	12	17	7	15

- A. (6, 10)
- B. (9, 4)
- C. (-3, 2)
- D. (-1, -5)

**Part 1 Response Page (continued)**19. C20. C**Total for Part 1 = \_\_\_\_\_ (Maximum possible: 40 marks)**

**Part 2: Short-Answer Questions**

60

6

Give the complete answers in the spaces provided on the response page at the right.

8

1. Write a mathematical statement for each of the following statements.
  - a. Uzma's age seven years ago
  - b. the product of a number and seven
  - c. Mrs. Edgar's salary doubled
2. Evaluate each of the following.
  - a.  $3m$  if  $m = 8$
  - b.  $2a - 1$  if  $a = -5$
  - c.  $b^2 - 2bc + c^2$  if  $b = 3$  and  $c = 4$
  - d.  $3(x + y)^2$  if  $x = -1$  and  $y = 3$

**Part 2 Response Page**

1. a.  $u - 7$

b.  $7n$

c.  $2e$

2. a. 24

b. - 11

c. 1

d. 12

**Part 2 (continued)****6**

3. Write an equation to describe each of the following situations.

- a. Sixteen more than a number is twenty.
- b. Twice a number plus triple the same number results in thirty.
- c. Three more than twice a number results in eight.

**8**

4. Solve each of the following equations by inspection or using the guess-check-revise method.

- a.  $3y = 21$
- b.  $n - 2 = -3$
- c.  $2m + 6m = 24$
- d.  $2x - 1 = 3$

**6**

5. Write an equation to describe each of the following situations.

- a. Ruth's age divided by Benjamin's age is two.
- b. Adrienne's new hourly wage is triple her previous hourly wage, diminished by eight dollars.
- c. The length of the yard is five metres less than twice the width.

**Part 2 Response Page (continued)**

3. a.  $n + 16 = 20$

b.  $2n + 3n = 30$

c.  $2n + 3 = 8$

4. a.  $y = 7$

b.  $n = -1$

c.  $m = 3$

d.  $x = 2$

5. a.  $r + b = 2$

b.  $a = 3p - 8$

c.  $l = 2w - 5$

**Part 2 (continued)**

6      6. Find three solutions for  $a = b + 2$ . Use inspection or guess-check-revise methods.

10     7. Graph the equation  $y = 2x + 3$ .

**Part 2 Response Page (continued)**

6. Answers will vary. Here are some examples.

$$a = 2, b = 0$$

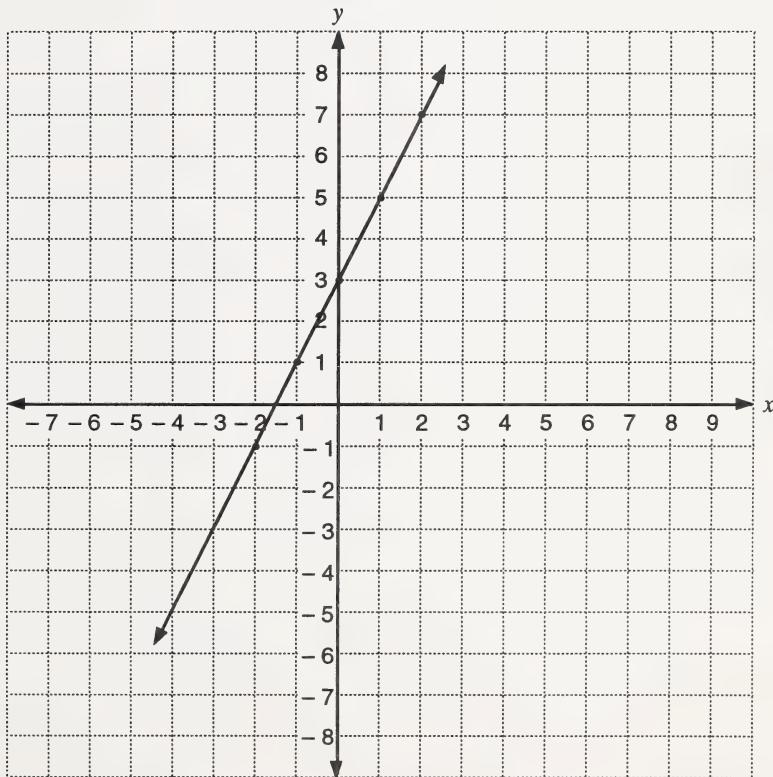
$$a = 3, b = 1$$

$$a = 4, b = 2$$

$$a = 5, b = 3$$

$$a = 6, b = 4$$

7.



Total for Part 2 = \_\_\_\_\_ (Maximum possible: 60 marks)

**Part 3: Problems****80****20**

Give complete answers in the spaces provided on the response page at the right. Be sure to clearly show how you arrived at your answer.

1. Use paper and pencil methods to solve each equation. Show all the steps and verify the solution.
  - a.  $4x + 5x = 27$
  - b.  $3a + 2 = 20$
  - c.  $5m = 25$
  - d.  $r - 8 = 19$
  - e.  $\frac{d}{2} = \frac{3}{5}$

**Part 3 Response Page**

1. a.  $x = 3$

b.  $a = 6$

c.  $m = 5$

d.  $r = 27$

e.  $d = \frac{6}{5}$  or  $1\frac{1}{5}$

**22****Part 3 (continued)**

2. Check the solutions given for the following equations. If the solutions are incorrect, solve the equation correctly using paper and pencil methods. Show all the steps and verify the solution.

- a.  $14x + 11x = 7.5, x = 3$
- b.  $j + \frac{1}{2} = \frac{3}{4}, j = 1\frac{1}{4}$
- c.  $5p - 1.2 = 3.8, p = 1$
- d.  $0.7d = 1.4, d = 2$
- e.  $\frac{3}{a} = \frac{2}{5}, a = 4.5$

**Part 3 Response Page (continued)**

2. a. The solution is incorrect;  $x = 0.3$ .

b. The solution is incorrect;  $j = \frac{1}{4}$ .

c. The solution is correct.

d. The solution is correct.

e. The solution is incorrect;  $a = 7.5$ .

**Part 3 (continued)****8**

3. The rental costs at two car rental agencies are based on the total distance driven in kilometres and a basic daily charge.

The rental cost at Triple A Company is \$0.08 for each kilometre driven plus a basic daily charge of \$20.00.

The rental cost at OK Company is \$0.06 for each kilometre driven plus a basic daily charge of \$24.00.

- a. Write an equation to describe each relation.
- b. Janice intends to rent a car for two days and she intends to drive a total distance of 500 km. From which company should she rent a car?

**10**

4. a. Give the next three terms in this sequence:

7, 9, 11, 13, , , 

b. Give the fiftieth term of the sequence.

**Part 3 Response Page (continued)**

3. a.  $t = 0.08k + 20d$

$$o = 0.06k + 24d$$

b. The cost from Triple A Company is \$80.

The cost from OK Company is \$78.

Janice should rent from OK Company.

4. a. 7, 9, 11, 13, [15], [17], [19]

b. You can use this expression to find the fiftieth term:

$$1 + (n - 1) \times 2$$

The fiftieth term is 99.

**Page 3 (continued)**

20

5. Each  $\blacksquare$  represents a different number. Find the value of each  $\blacksquare$ .  
Hint: the exponent is either 1 or 2.

a.

$m$	$\blacksquare m^{\blacksquare} - 1$
1	3
2	7
3	11
4	15
5	$\blacksquare$
6	$\blacksquare$
7	$\blacksquare$

b.

$m$	$\blacksquare m^{\blacksquare} - 1$
1	1
2	7
3	17
4	31
5	$\blacksquare$
6	$\blacksquare$
7	$\blacksquare$

**Part 3 Response Page (continued)**

5. a.

$m$	$[4] m^{\boxed{1}} - 1$
1	3
2	7
3	11
4	15
5	19
6	23
7	27

Pattern  
 } + 4  
 } + 4  
 } + 4  
 } + 4  
 } + 4  
 } + 4  
 } + 4

b.

$m$	$[2] m^{\boxed{2}} - 1$
1	1
2	7
3	17
4	31
5	49
6	71
7	97

Pattern  
 } + 6      } + 4  
 } + 10    } + 4  
 } + 14    } + 4  
 } + 18    } + 4  
 } + 22    } + 4  
 } + 26    }

Total for Part 3 = \_\_\_\_\_ (Maximum possible: 80 marks)

### Table 2. Propagation and regeneration of *L. sericea*

a. Early regeneration after cutting mature *L. sericea* stands in 1982

mature <sup>a</sup>	1983		
	1	2	3
0.0	0	0	0
0.1	0	0	0
0.2	0	0	0
0.3	0	0	0
0.4	0	0	0
0.5	0	0	0
0.6	0	0	0
0.7	0	0	0
0.8	0	0	0
0.9	0	0	0
1.0	0	0	0
1.1	0	0	0
1.2	0	0	0
1.3	0	0	0
1.4	0	0	0
1.5	0	0	0
1.6	0	0	0
1.7	0	0	0
1.8	0	0	0
1.9	0	0	0
2.0	0	0	0
2.1	0	0	0
2.2	0	0	0
2.3	0	0	0
2.4	0	0	0
2.5	0	0	0
2.6	0	0	0
2.7	0	0	0
2.8	0	0	0
2.9	0	0	0
3.0	0	0	0
3.1	0	0	0
3.2	0	0	0
3.3	0	0	0
3.4	0	0	0
3.5	0	0	0
3.6	0	0	0
3.7	0	0	0
3.8	0	0	0
3.9	0	0	0
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4.1	0	0	0
4.2	0	0	0
4.3	0	0	0
4.4	0	0	0
4.5	0	0	0
4.6	0	0	0
4.7	0	0	0
4.8	0	0	0
4.9	0	0	0
5.0	0	0	0
5.1	0	0	0
5.2	0	0	0
5.3	0	0	0
5.4	0	0	0
5.5	0	0	0
5.6	0	0	0
5.7	0	0	0
5.8	0	0	0
5.9	0	0	0
6.0	0	0	0
6.1	0	0	0
6.2	0	0	0
6.3	0	0	0
6.4	0	0	0
6.5	0	0	0
6.6	0	0	0
6.7	0	0	0
6.8	0	0	0
6.9	0	0	0
7.0	0	0	0
7.1	0	0	0
7.2	0	0	0
7.3	0	0	0
7.4	0	0	0
7.5	0	0	0
7.6	0	0	0
7.7	0	0	0
7.8	0	0	0
7.9	0	0	0
8.0	0	0	0
8.1	0	0	0
8.2	0	0	0
8.3	0	0	0
8.4	0	0	0
8.5	0	0	0
8.6	0	0	0
8.7	0	0	0
8.8	0	0	0
8.9	0	0	0
9.0	0	0	0
9.1	0	0	0
9.2	0	0	0
9.3	0	0	0
9.4	0	0	0
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9.8	0	0	0
9.9	0	0	0
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10.8	0	0	0
10.9	0	0	0
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11.4	0	0	0
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11.7	0	0	0
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12.9	0	0	0
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14.7	0	0	0
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14.9	0	0	0
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15.1	0	0	0
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15.3	0	0	0
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15.8	0	0	0
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16.2	0	0	0
16.3	0	0	0
16.4	0	0	0
16.5	0	0	0
16.6	0	0	0
16.7	0	0	0
16.8	0	0	0
16.9	0	0	0
17.0	0	0	0
17.1	0	0	0
17.2	0	0	0
17.3	0	0	0
17.4	0	0	0
17.5	0	0	0
17.6	0	0	0
17.7	0	0	0
17.8	0	0	0
17.9	0	0	0
18.0	0	0	0
18.1	0	0	0
18.2	0	0	0
18.3	0	0	0
18.4	0	0	0
18.5	0	0	0
18.6	0	0	0
18.7	0	0	0
18.8	0	0	0
18.9	0	0	0
19.0	0	0	0
19.1	0	0	0
19.2	0	0	0
19.3	0	0	0
19.4	0	0	0
19.5	0	0	0
19.6	0	0	0
19.7	0	0	0
19.8	0	0	0
19.9	0	0	0
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20.1	0	0	0
20.2	0	0	0
20.3	0	0	0
20.4	0	0	0
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21.9	0	0	0
22.0	0	0	0
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22.3	0	0	0
22.4	0	0	0
22.5	0	0	0
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23.2	0	0	0
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23.7	0	0	0
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37.6	0	0	0
37.7	0	0	0
37.8	0	0	0
37.9	0	0	0
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38.1	0	0	0
38.2	0	0	0
38.3	0	0	0
38.4	0	0	



